DRUG SELECTION MODEL

About the Model:-

In this model there are 5 diffrent drugs A,B,C,X and Y.

According to Age,Sex and medical conditions we have to predict which drug is suitable.

In [ ]:

```
# import all the necessary libraries
```

In [3]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings("ignore")
```

In [4]:

```
# import the dataset
```

In [5]:

```
df = pd.read_csv("drug200.csv")
df.head()
```

Out[5]:

	Age	Sex	BP	Cholesterol	Na_to_K	Drug
0	23	F	HIGH	HIGH	25.355	drugY
1	47	M	LOW	HIGH	13.093	drugC
2	47	M	LOW	HIGH	10.114	drugC
3	28	F	NORMAL	HIGH	7.798	drugX
4	61	F	LOW	HIGH	18.043	drugY

EDA

In [6]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 6 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   Age          200 non-null    int64  
 1   Sex          200 non-null    object 
 2   BP           200 non-null    object 
 3   Cholesterol  200 non-null    object 
 4   Na_to_K      200 non-null    float64
 5   Drug         200 non-null    object 
```

```
dtypes: float64(1), int64(1), object(4)
memory usage: 9.5+ KB
```

In [7]:

```
df.isna().sum()
```

Out[7]:

```
Age            0
Sex            0
BP             0
Cholesterol    0
Na_to_K        0
Drug           0
dtype: int64
```

In [8]:

```
df.shape
```

Out[8]:

```
(200, 6)
```

In [9]:

```
df.describe()
```

Out[9]:

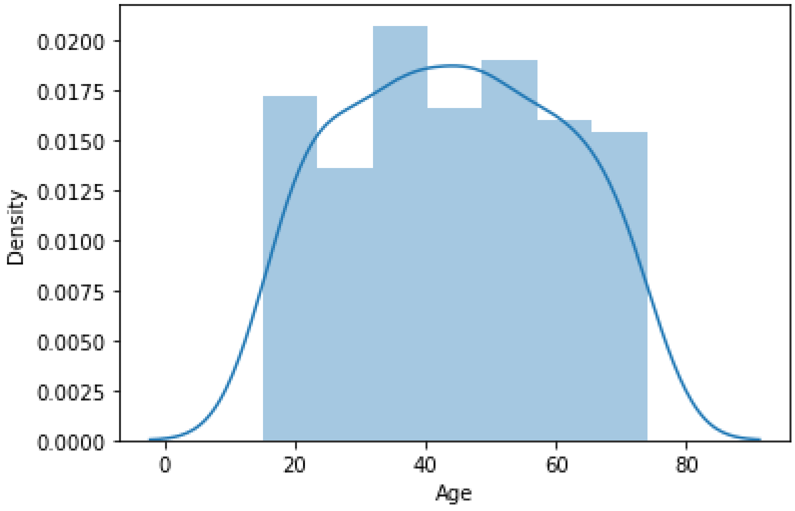
	Age	Na_to_K
count	200.000000	200.000000
mean	44.315000	16.084485
std	16.544315	7.223956
min	15.000000	6.269000
25%	31.000000	10.445500
50%	45.000000	13.936500
75%	58.000000	19.380000
max	74.000000	38.247000

In [10]:

```
sns.distplot(df["Age"],kde= True)
```

Out[10]:

```
<AxesSubplot:xlabel='Age', ylabel='Density'>
```

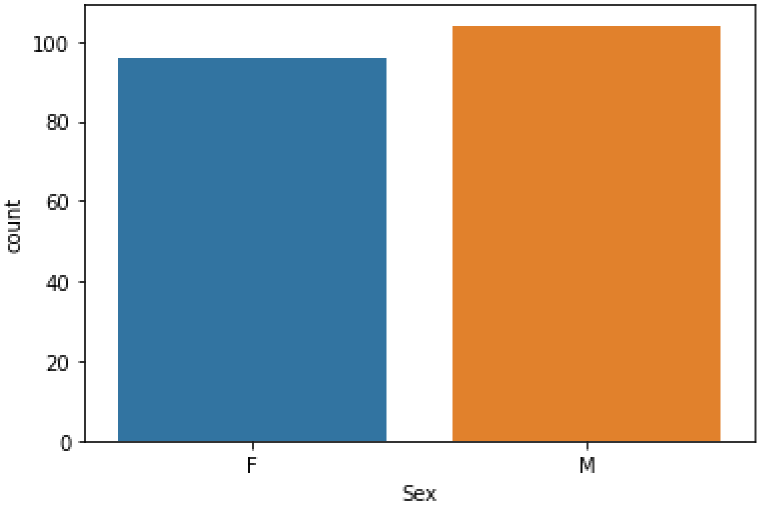


In [11]:

```
sns.countplot(x= "Sex",data= df)
```

Out[11]:

```
<AxesSubplot:xlabel='Sex', ylabel='count'>
```

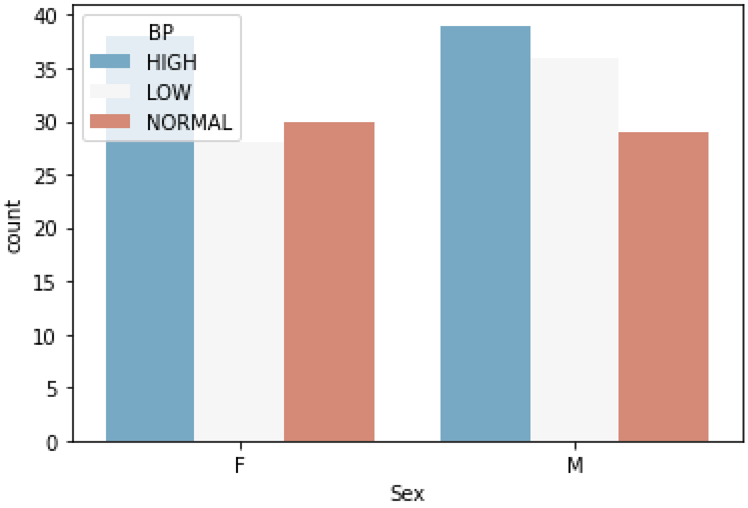


In [16]:

```
sns.countplot(x= "Sex",hue= "BP",data= df,palette= 'RdBu_r')
```

Out[16]:

```
<AxesSubplot:xlabel='Sex', ylabel='count'>
```

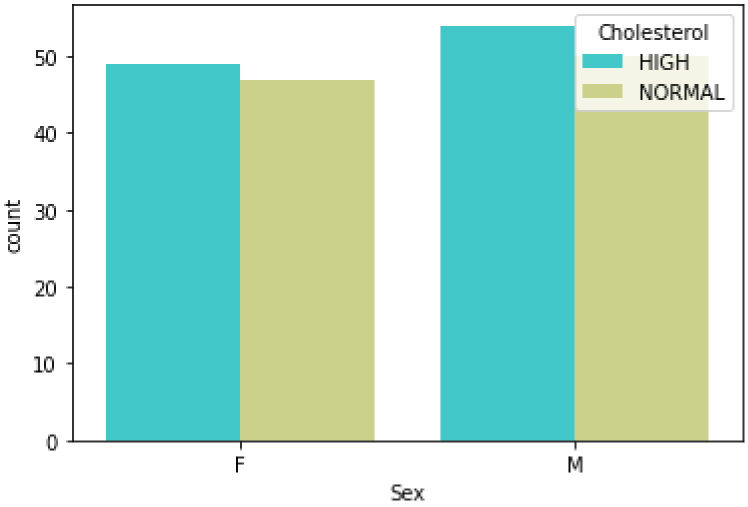


In [76]:

```
sns.countplot(x= "Sex",hue= "Cholesterol",data= df,palette= 'rainbow')
```

Out[76]:

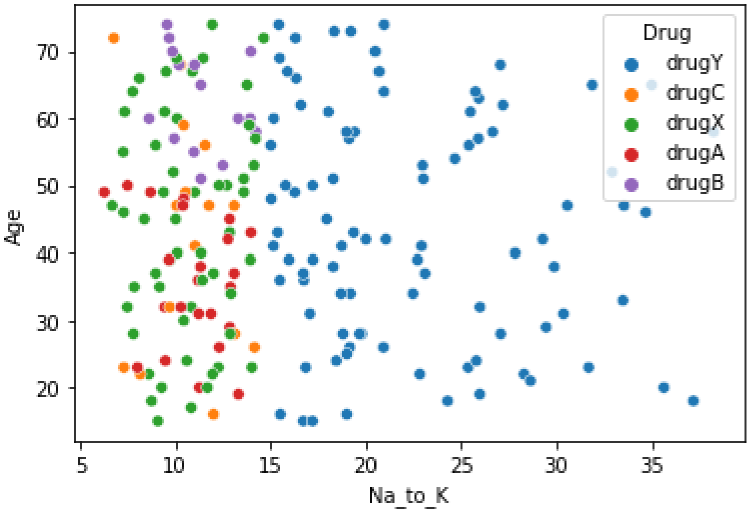
```
<AxesSubplot:xlabel='Sex', ylabel='count'>
```



In [47]:

```
sns.scatterplot(data= df,x="Na_to_K",y="Age",hue= "Drug")
```

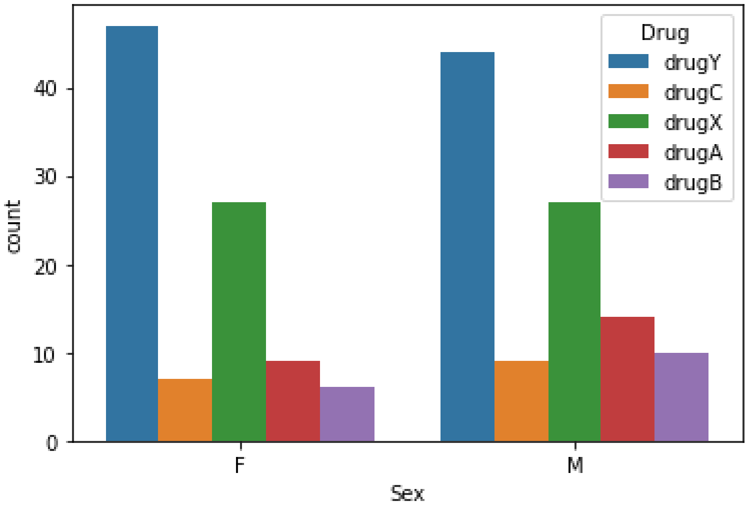
Out[47]: `<AxesSubplot:xlabel='Na_to_K', ylabel='Age'>`



In [51]:

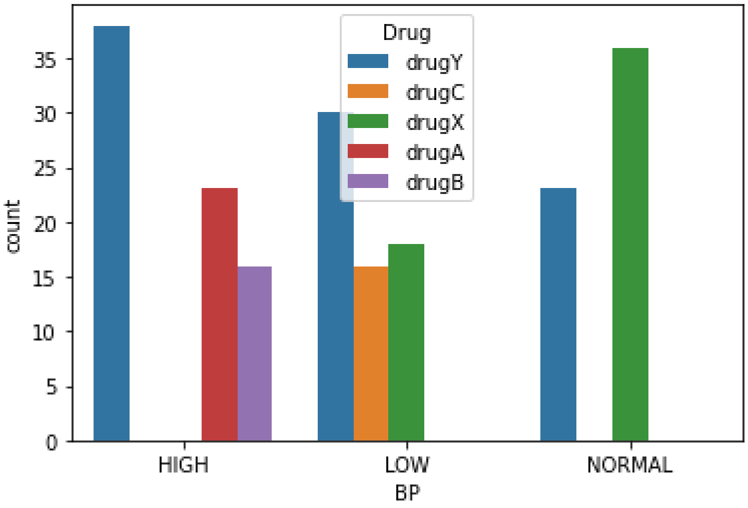
```
sns.countplot(data = df,x= "Sex" ,hue= "Drug")
```

Out[51]: `<AxesSubplot:xlabel='Sex', ylabel='count'>`



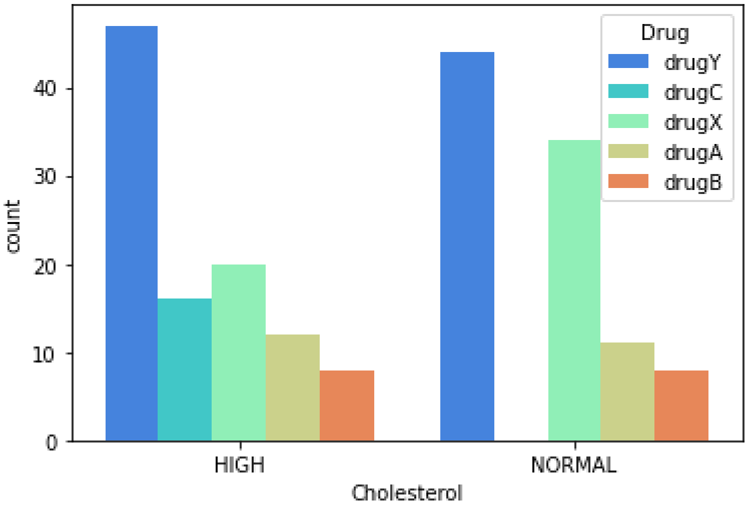
In [54]:
```
sns.countplot(data = df,x= "BP" ,hue= "Drug")
```

Out[54]:
```
<AxesSubplot:xlabel='BP', ylabel='count'>
```



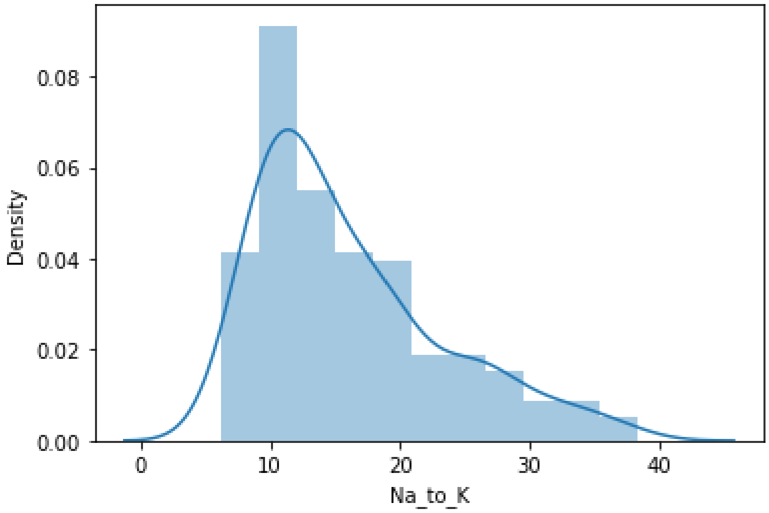
In [17]:
```
sns.countplot(data = df,x= "Cholesterol" ,hue= "Drug",palette= 'rainbow')
```

Out[17]:
```
<AxesSubplot:xlabel='Cholesterol', ylabel='count'>
```



In [37]:
```
sns.distplot(df["Na_to_K"])
```

Out[37]:
```
<AxesSubplot:xlabel='Na_to_K', ylabel='Density'>
```

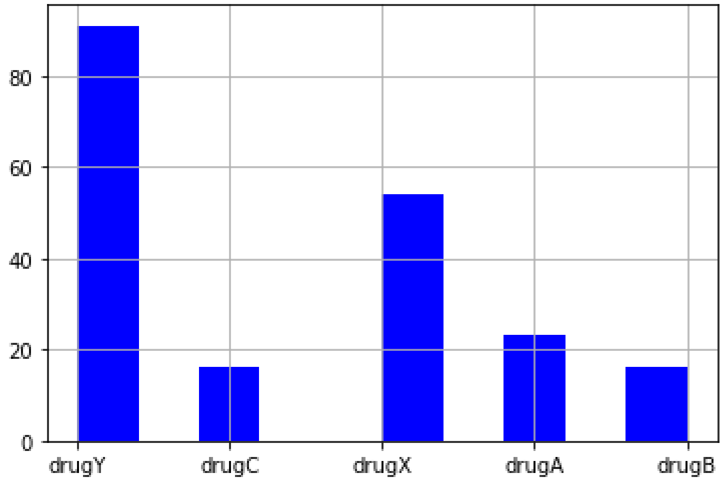


In [58]:

```
df["Drug"].hist(color="blue")
```

Out[58]:

```
<AxesSubplot:>
```



Separate X and Y

In [34]:

```
x= df.iloc[:,:-1]
y= df.iloc[:,-1]
```

Data Cleaning

In [35]:

```
from sklearn.compose import ColumnTransformer
from sklearn.preprocessing import OneHotEncoder
ct = ColumnTransformer(transformers = [('encoder', OneHotEncoder(), ['Sex','BP','Choles

x = np.array( ct.fit_transform(x))
```

Train test split the model

In [36]:

```
from sklearn.model_selection import train_test_split
xtrain, xtest,ytrain,ytest= train_test_split(x,y,test_size=0.3)
```

Model Building with Logistic Regression

In [40]:

```
from sklearn.linear_model import LogisticRegression

logreg = LogisticRegression()
logreg.fit(xtrain,ytrain)
ypred = logreg.predict(xtest)
```

Check the Accuracy of logreg Model

In [41]:

```
from sklearn.metrics import accuracy_score
print(f'accuracy_score:{accuracy_score(ytest,ypred)}')
```

```
accuracy_score:0.9166666666666666
```

In [42]:

```
from sklearn.metrics import classification_report,plot_confusion_matrix,plot_roc_curve
print(classification_report(ytest,ypred))
```

```
              precision    recall  f1-score   support

       drugA       0.80      0.80      0.80         5
       drugB       0.80      0.80      0.80         5
       drugC       1.00      0.67      0.80         6
       drugX       0.95      1.00      0.97        19
       drugY       0.92      0.96      0.94        25

    accuracy                           0.92        60
   macro avg       0.89      0.85      0.86        60
weighted avg       0.92      0.92      0.91        60
```

In [73]:

```
from sklearn.metrics import confusion_matrix
print(confusion_matrix(ytest,ypred))
```

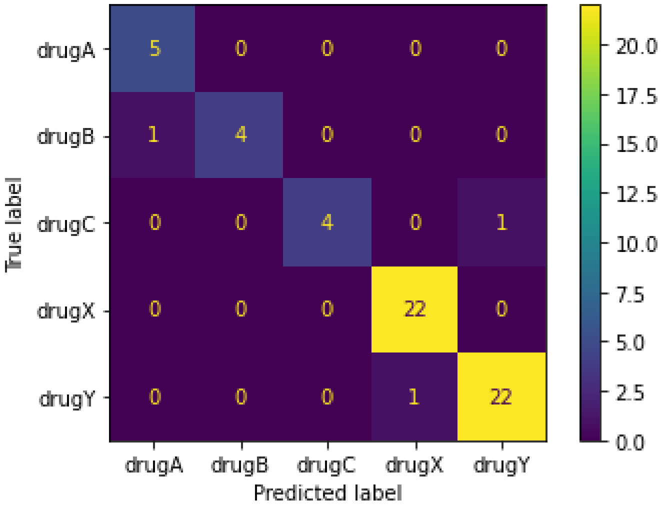
```
[[ 5  0  0  0  0]
 [ 1  4  0  0  0]
 [ 0  0  4  0  1]
 [ 0  0  0 22  0]
 [ 0  0  0  1 22]]
```

In [74]:

```
plot_confusion_matrix(logreg,xtest,ytest)
```

Out[74]:

```
<sklearn.metrics._plot.confusion_matrix.ConfusionMatrixDisplay at 0x22486297670>
```



Model Building with K-Nearest Neighbor

In [93]:

```
from sklearn.model_selection import train_test_split
xtrain, xtest,ytrain,ytest= train_test_split(x,y,test_size=0.2)
```

In [60]:

```
from sklearn.neighbors import KNeighborsClassifier

knn = KNeighborsClassifier(n_neighbors =5)
knn.fit(xtrain,ytrain)
ypredn = knn.predict(xtest)
```

Check the Accuracy of knn Model

In [61]:

```
from sklearn.metrics import accuracy_score
print(f'Accuracy :- {accuracy_score(ytest,ypredn)}')
```

```
Accuracy :- 0.7166666666666667
```

In [72]:

```
from sklearn.model_selection import cross_val_score
cvs = cross_val_score(knn,x,y,cv = 10,scoring = 'accuracy')
print (f"Avg Accuracy-: {cvs.mean()}")
```

```
Avg Accuracy-: 0.68
```

Conclusion:

Model made with Logistic Regression gives Accuracy of 91.66%

Model made with Classification(KNN) gives Accuracy of 71.66%