In [86]:
```
import pandas as pd
import numpy as np
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler ,OneHotEncoder
from sklearn.metrics import f1_score ,accuracy_score ,confusion_matrix
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.pipeline import Pipeline
import seaborn as sns
from sklearn.compose import ColumnTransformer
from sklearn.svm import SVC
from sklearn.neighbors import KNeighborsClassifier
```

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C2-06

Question 1

In [92]:
```
def pattern():
    for i in range(5):
        for j in range(9):
            if j == 0 or j == 8 or (i == j and j > 4) or (i == 4 and j % 2 == 0):
                print("**", end=" ")
            else:
                print(" ", end=" ")
        print()
```

```
**          **
**          **
**    **    **
**  ** **  **
**          **
```

Question 2

In [50]:

```
arr = np.zeros((8, 8))
for a in range(8):
    for b in range(8):
        if (a + b) % 2 == 0:
            arr[a, b] = 1

print(arr)
```

```
[[1. 0. 1. 0. 1. 0. 1. 0.]
 [0. 1. 0. 1. 0. 1. 0. 1.]
 [1. 0. 1. 0. 1. 0. 1. 0.]
 [0. 1. 0. 1. 0. 1. 0. 1.]
 [1. 0. 1. 0. 1. 0. 1. 0.]
 [0. 1. 0. 1. 0. 1. 0. 1.]
 [1. 0. 1. 0. 1. 0. 1. 0.]
 [0. 1. 0. 1. 0. 1. 0. 1.]]
```

In [ ]:

Question 3

```
In [22]: data = pd.read_csv("../DataSets/heart.csv")
         data.isna().sum()
```

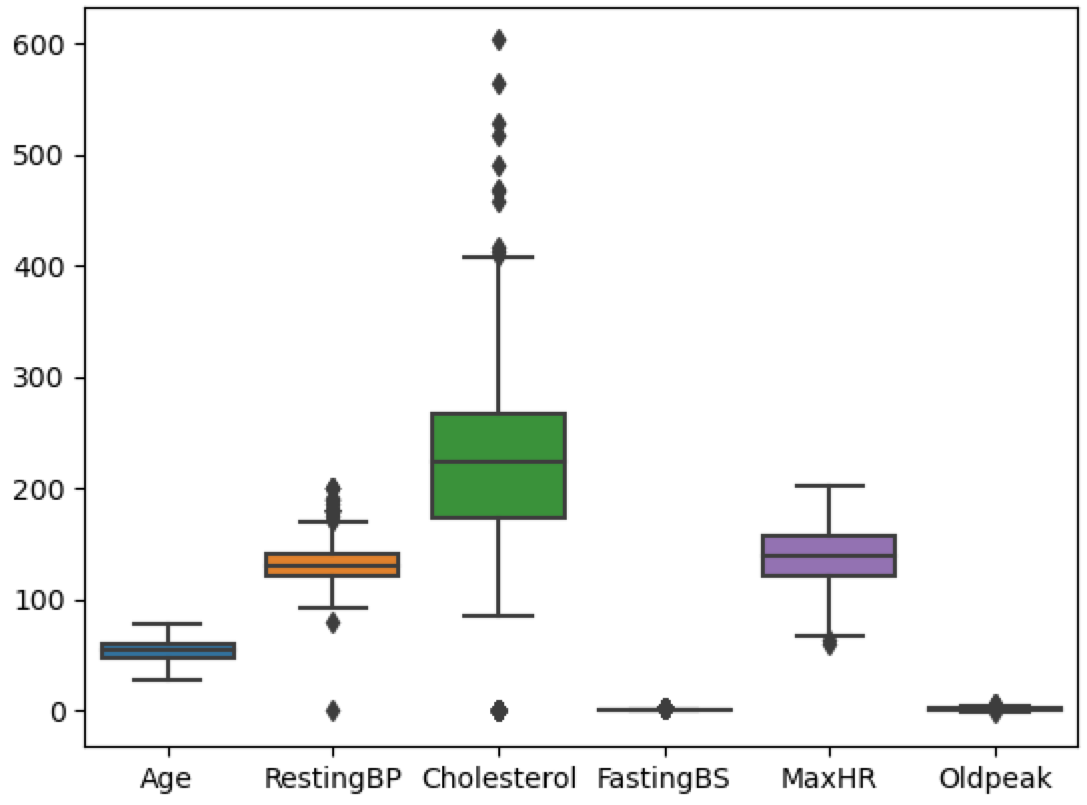
```
Out[22]: Age               0
         Sex               0
         ChestPainType     0
         RestingBP         0
         Cholesterol       0
         FastingBS         0
         RestingECG        0
         MaxHR             0
         ExerciseAngina    0
         Oldpeak           0
         ST_Slope          0
         HeartDisease      0
         dtype: int64
```

In [20]:
```
df = data.drop("HeartDisease",axis = 1)

sns.boxplot(data =df )

## As you can see from boxplot there are outlier shown in diamond shape mean there are outliers
##  in RestingBP  Cholesterol FastingBS RestingECG MaxHR which can decrease our model accuracy
```

Out[20]:
```
<Axes: >
```



Question 4

In [29]:
```
data
```

Out[29]:

	Age	Sex	ChestPainType	RestingBP	Cholesterol	FastingBS	RestingECG	MaxHR	ExerciseAngina	Oldpeak	ST_Slope	HeartDis
0	40	M	ATA	140	289	0	Normal	172	N	0.0	Up	
1	49	F	NAP	160	180	0	Normal	156	N	1.0	Flat	
2	37	M	ATA	130	283	0	ST	98	N	0.0	Up	
3	48	F	ASY	138	214	0	Normal	108	Y	1.5	Flat	
4	54	M	NAP	150	195	0	Normal	122	N	0.0	Up	
...	...	...	...	...	...	...	...	...	...	...	...	
913	45	M	TA	110	264	0	Normal	132	N	1.2	Flat	
914	68	M	ASY	144	193	1	Normal	141	N	3.4	Flat	
915	57	M	ASY	130	131	0	Normal	115	Y	1.2	Flat	
916	57	F	ATA	130	236	0	LVH	174	N	0.0	Flat	
917	38	M	NAP	138	175	0	Normal	173	N	0.0	Up	

918 rows × 12 columns

In [81]:
```
x = data.drop("HeartDisease",axis=1)
y = data["HeartDisease"]

numeric = ["Age","RestingBP","Cholesterol","MaxHR","Oldpeak"]
categ = ["Sex","ChestPainType","RestingECG","ExerciseAngina","ST_Slope"]

transformer = ColumnTransformer([("scaling",StandardScaler() ,numeric),
                                 ("categor",OneHotEncoder(),categ)],remainder="passthrough")

trans_x = transformer.fit_transform(x)

x_train ,x_test ,y_train , y_test = train_test_split(trans_x , y,test_size = 0.3 ,random_state = 42)
```

In [82]:
```
## using random Forest Classifier

clf = RandomForestClassifier()
clf.fit(x_train,y_train)

print("Model score",clf.score(x_test ,y_test))


y_preds  = clf.predict(x_test)

print("Accuray",accuracy_score(y_test ,y_preds))
print("f1_score",f1_score(y_test ,y_preds))
```

```
Model score 0.8586956521739131
Accuray 0.8586956521739131
f1_score 0.8792569659442725
```

In [83]:
```
## Using Decision Tree


dcf = DecisionTreeClassifier()
dcf.fit(x_train,y_train)

print(dcf.score(x_test ,y_test))

y_preds  = dcf.predict(x_test)
print("Accuray",accuracy_score(y_test ,y_preds))
print("f1_score",f1_score(y_test ,y_preds))
```

```
0.7572463768115942
Accuray 0.7572463768115942
f1_score 0.780327868852459
```

In [84]:
```
## Using LogisticRegression

lg = LogisticRegression()
lg.fit(x_train,y_train)

print(lg.score(x_test ,y_test))

y_preds  = lg.predict(x_test)
print("Accuray",accuracy_score(y_test ,y_preds))
print("f1_score",f1_score(y_test ,y_preds))
```

```
0.8804347826086957
Accuray 0.8804347826086957
f1_score 0.897196261682243
```

In [85]:
```
## Using SVC

svc = SVC()
svc.fit(x_train,y_train)

print(svc.score(x_test ,y_test))

y_preds  = svc.predict(x_test)
print("Accuray",accuracy_score(y_test ,y_preds))
print("f1_score",f1_score(y_test ,y_preds))
```

```
0.8876811594202898
Accuray 0.8876811594202898
f1_score 0.9063444108761329
```

In [87]:
```
## Using KNN

knn = KNeighborsClassifier()
knn.fit(x_train,y_train)

print(knn.score(x_test ,y_test))

y_preds  = knn.predict(x_test)
print("Accuray",accuracy_score(y_test ,y_preds))
print("f1_score",f1_score(y_test ,y_preds))
```

```
0.8913043478260869
Accuray 0.8913043478260869
f1_score 0.9085365853658537
```

Question 5

Problem :

```
I have to train a model which will predict HeartDisease based on the different condition of patient
```

Importing Data

```
 First I have import the data from my computer which is in csv(Comma seperated values) into my jupit
er file
 and converted it into DataFrame so i can easily manipulate it in pandas.
```

Data Cleaning

```
 I first check the data and checked if there are any missing data or duplicates values in it
  so i can remove it before preprocessing.
```

Data Visualization

```
    After cleaning the data we I visualize the data in a boxplot to see if there are any outliears i
n it.
```

Data Preprocessing

```
    After visualizing the data i used OneHotEncoder and standardScaler to encode the categorical col
ums and to scale
    the numerical colums so our model can better understand our data.
```

Model Selection

```
    so I are selecting my model  based on measuring multiple test models accuracy_score ,model_score
and f1_score
    and by doing trail and error have selected RandomForestClassifier as my model because it gives m
```

In [ ]:

```

```

In [ ]:

```
```