task 3

In [4]:
```
#reading the file
import pandas as pd
data = pd.read_csv("heart.csv")
data
```

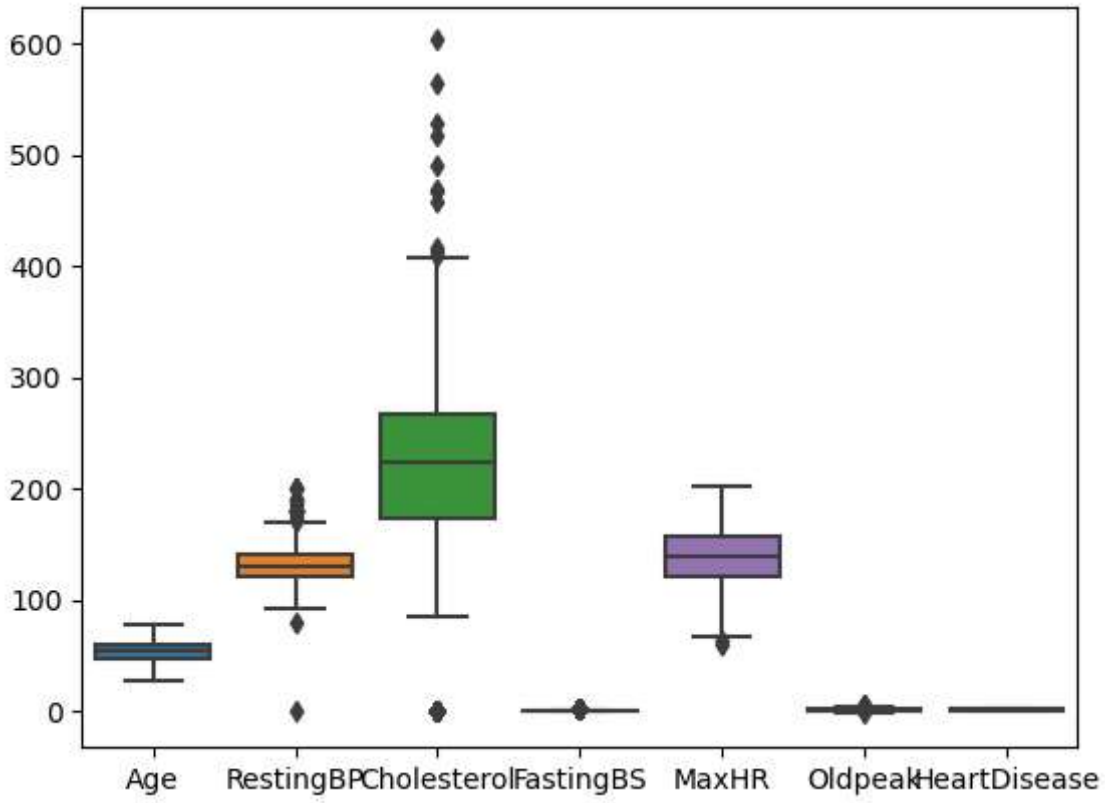
Out[4]:

	Age	Sex	RestingBP	Cholesterol	FastingBS	RestingECG	MaxHR	ExerciseAngina	Oldpea
0	40	M	140	289	0	Normal	172	N	0.
1	49	F	160	180	0	Normal	156	N	1.
2	37	M	130	283	0	ST	98	N	0.
3	48	F	138	214	0	Normal	108	Y	1.
4	54	M	150	195	0	Normal	122	N	0.
...	...	...	...	...	...	...	...	...	.
913	45	M	110	264	0	Normal	132	N	1.
914	68	M	144	193	1	Normal	141	N	3.
915	57	M	130	131	0	Normal	115	Y	1.
916	57	F	130	236	0	LVH	174	N	0.
917	38	M	138	175	0	Normal	173	N	0.

918 rows × 11 columns

In [5]:
```
#drawing the boxplot
import seaborn as sns
sns.boxplot(data)
```

Out[5]: <Axes: >



task 4

In [6]:
```
#getting data
data.head()
```

Out[6]:

	Age	Sex	RestingBP	Cholesterol	FastingBS	RestingECG	MaxHR	ExerciseAngina	Oldpeak
0	40	M	140	289	0	Normal	172	N	0.0
1	49	F	160	180	0	Normal	156	N	1.0
2	37	M	130	283	0	ST	98	N	0.0
3	48	F	138	214	0	Normal	108	Y	1.5
4	54	M	150	195	0	Normal	122	N	0.0

In [26]:
```
#encoding the catagorical data into numerical data
from sklearn.preprocessing import OneHotEncoder, LabelEncoder
from sklearn.compose import ColumnTransformer
encoder = LabelEncoder()
```

In [35]:
```
#encoding the catagorical data into numerical data
s = data["Sex"]
data["Sex"] = encoder.fit_transform(s)

r = data["RestingECG"]
data["RestingECG"] = encoder.fit_transform(r)

e = data["ExerciseAngina"]
data["ExerciseAngina"] = encoder.fit_transform(e)

st = data["ST_Slope"]
data["ST_Slope"] = encoder.fit_transform(st)
```

In [38]:
```
data.head()
```

Out[38]:

	Age	Sex	RestingBP	Cholesterol	FastingBS	RestingECG	MaxHR	ExerciseAngina	Oldpeak
0	40	1	140	289	0	1	172	0	0.0
1	49	0	160	180	0	1	156	0	1.0
2	37	1	130	283	0	2	98	0	0.0
3	48	0	138	214	0	1	108	1	1.5
4	54	1	150	195	0	1	122	0	0.0

In [41]:
```
#spliting the data into x and y
x = data.drop("HeartDisease", axis = 1)
y = data["HeartDisease"]
```

In [43]:
```
x.head(),  y.head()
```

Out[43]:
```
(   Age  Sex  RestingBP  Cholesterol  FastingBS  RestingECG  MaxHR  \
 0   40    1        140          289          0           1    172
 1   49    0        160          180          0           1    156
 2   37    1        130          283          0           2     98
 3   48    0        138          214          0           1    108
 4   54    1        150          195          0           1    122

    ExerciseAngina  Oldpeak  ST_Slope
 0               0      0.0         2
 1               0      1.0         1
 2               0      0.0         2
 3               1      1.5         1
 4               0      0.0         2  ,
 0    0
 1    1
 2    0
 3    1
 4    0
 Name: HeartDisease, dtype: int64)
```

In [46]:
```
#spliting the data into train and test
from sklearn.model_selection import train_test_split
import numpy as np
```

In [47]:
```
np.random.seed(42)
x_train, x_test, y_train, y_test = train_test_split(x,y,test_size = 0.2)
```

In [48]:
```
x_train.shape, x_test.shape, y_train.shape, y_test.shape
```

Out[48]:
```
((734, 10), (184, 10), (734,), (184,))
```

In [50]:
```
#importing the model
from sklearn.ensemble import RandomForestRegressor
```

In [69]:
```
#fitting the data into model
model = RandomForestRegressor(n_estimators=45)
model.fit(x_train, y_train)
```

Out[69]:
```
RandomForestRegressor(n_estimators=45)
```

In a Jupyter environment, please rerun this cell to show the HTML representation or trust the notebook.
On GitHub, the HTML representation is unable to render, please try loading this page with nbviewer.org.

In [70]:
```
#checking the score of training data
model.score(x_train, y_train)#
```

Out[70]:
```
0.930900868541951
```

In [72]:
```
#checking the score of testing data
model.score(x_test, y_test)
```

Out[72]:
```
0.5320036142466049
```

In [68]:
```
#checking at which value of estimator the score will be maximum
np.random.seed(32)
for i in range(1,100,1):
    print(f"Tring model with {i} estimators ...")
    model = RandomForestRegressor(n_estimators = i).fit(x_train, y_train)
    print(f"Model accuracy on test set: {model.score(x_test, y_test) * 100: 2f}
    print("")
```

```
Tring model with 1 estimators ...
Model accuracy on test set:  12.902051%

Tring model with 2 estimators ...
Model accuracy on test set:  36.909819%

Tring model with 3 estimators ...
Model accuracy on test set:  47.393832%

Tring model with 4 estimators ...
Model accuracy on test set:  38.026460%

Tring model with 5 estimators ...
Model accuracy on test set:  51.493142%

Tring model with 6 estimators ...
Model accuracy on test set:  52.170571%

Tring model with 7 estimators ...
```

In [73]:
```
from sklearn.metrics import accuracy_score
```

In [82]:
```
y_predict = model.predict(x_train)
```

In [80]:
```
y_predict
```

Out[80]:
```
array([0.13333333, 0.75555556, 0.95555556, 0.93333333, 0.15555556,
       0.55555556, 0.75555556, 0.06666667, 0.55555556, 0.95555556,
       0.62222222, 0.06666667, 0.37777778, 0.17777778, 0.88888889,
       0.95555556, 0.13333333, 0.62222222, 0.44444444, 0.37777778,
       1.        , 0.75555556, 0.        , 0.51111111, 0.75555556,
       0.86666667, 0.        , 0.88888889, 0.02222222, 0.        ,
       0.91111111, 0.        , 0.88888889, 0.91111111, 0.88888889,
       0.44444444, 1.        , 0.        , 0.82222222, 0.86666667,
       0.6       , 0.97777778, 0.57777778, 0.        , 0.08888889,
       0.62222222, 0.68888889, 0.75555556, 0.95555556, 0.71111111,
       0.11111111, 0.        , 0.97777778, 1.        , 0.28888889,
       0.11111111, 0.13333333, 0.82222222, 0.57777778, 0.73333333,
       0.4       , 0.04444444, 0.        , 0.93333333, 0.24444444,
       0.97777778, 1.        , 0.95555556, 1.        , 0.33333333,
       0.6       , 0.        , 0.93333333, 0.71111111, 0.        ,
       0.75555556, 0.4       , 0.64444444, 0.17777778, 0.42222222,
       0.28888889, 0.82222222, 1.        , 0.        , 0.91111111,
       0.8       , 0.        , 0.75555556, 0.        , 0.31111111,
       0.24444444, 0.84444444, 0.97777778, 0.35555556, 0.57777778,
       0.        , 0.68888889, 0.44444444, 0.73333333, 0.77777778,
       0.2       , 0.97777778, 0.6       , 0.        , 0.64444444,
       0.86666667, 0.        , 0.44444444, 0.93333333, 0.13333333,
       0.88888889, 0.93333333, 0.13333333, 0.15555556, 1.        ,
       0.08888889, 0.93333333, 0.        , 0.91111111, 0.68888889,
       0.91111111, 0.64444444, 0.93333333, 0.4       , 0.08888889,
       0.        , 0.15555556, 0.48888889, 0.        , 0.08888889,
       0.46666667, 1.        , 0.91111111, 0.11111111, 0.95555556,
       0.04444444, 0.77777778, 0.82222222, 0.        , 0.82222222,
       0.04444444, 0.15555556, 0.68888889, 0.84444444, 1.        ,
       0.68888889, 0.93333333, 0.35555556, 0.06666667, 0.13333333,
       0.        , 0.57777778, 0.68888889, 0.15555556, 0.68888889,
       0.        , 0.02222222, 0.        , 0.        , 0.86666667,
       0.        , 0.02222222, 0.93333333, 0.        , 0.91111111,
       0.8       , 0.53333333, 1.        , 0.13333333, 0.51111111,
       0.97777778, 0.77777778, 0.        , 0.53333333, 0.        ,
       0.97777778, 0.44444444, 0.62222222, 0.15555556, 0.6       ,
       0.71111111, 1.        , 0.04444444, 1.        ])
```

task 2

In [139]:
```
matrix = []
for i in range(8):
    row = []
    for j in range(8):
        if (i + j) % 2 == 0:
            row.append(1)
        else:
            row.append(0)
    matrix.append(row)



matrix
```

Out[139]:
```
[[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]]
```

task 1

In [138]:
```
for i in range(5):
    for j in range(5):
        if j == 0 or j == 4 or (i == j and i >= 2) or (i == 3 and j == 1):
            print("**", end=" ")
        else:
            print("  ", end=" ")
    print()
```

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

task 5

working of the model

1. first we read the file, using pandas
2. we saw that if the data is catagorical or numerical, i see that out target is in numerical, so i prefer the RandomForestRegressor
3. but there a problem, 😑, regressing expects the numerical data as input
4. so to overcome the problem we will use the labelencoder to convert the catagorical data into numerical

5. after converting the data we seperated the x and y, features and labels
6. then we use the seperate the data inot train and test
7. now we import out model and fit the data onto it
8. after fitting the data, i saw at what estimator value the score will be maximun so we can get the high accuracy score