13. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.

```
import numpy as np

import pandas as pd

from pgmpy.models import BayesianNetwork

from pgmpy.models import BayesianModel

from pgmpy.estimators import MaximumLikelihoodEstimator

from pgmpy.inference import VariableElimination


# Read Cleveland Heart Disease data

heartDisease = pd.read_csv('C:/Users/kamle/Downloads/ML/prac8/heart.csv')

heartDisease = heartDisease.replace('?', np.nan)


# Display the data

print('Few examples from the dataset are given below')

print(heartDisease.head())


# Model Bayesian Network

model = BayesianModel([('age', 'trestbps'), ('age', 'fbs'),('sex', 'trestbps'), ('exang', 'trestbps'),
('trestbps', 'heartdisease'),('fbs', 'heartdisease'), ('heartdisease', 'restecg'),('heartdisease', 'thalach'),
('heartdisease', 'chol')])

#estimator = MaximumLikelihoodEstimator(model, data)

# Learning CPDs using Maximum Likelihood Estimators

print('\nLearning CPD using Maximum likelihood estimators')

model.fit(heartDisease, estimator=MaximumLikelihoodEstimator)


# Inferencing with Bayesian Network

print('\nInferencing with Bayesian Network:')

HeartDisease_infer = VariableElimination(model)


# Computing the Probability of HeartDisease given Age

print('\n1. Probability of HeartDisease given Age=28')
```

```
q = HeartDisease_infer.query(variables=['heartdisease'], evidence={'age': 28})
print(q['heartdisease'])

# Computing the Probability of HeartDisease given cholesterol
print('\n2. Probability of HeartDisease given cholesterol=100')
q = HeartDisease_infer.query(variables=['heartdisease'], evidence={'chol': 100})
print(q['heartdisease'])
```