PROGRAM-15

MIN- MAX ALGORITHM PROBLEM

AIM:-

To write and execute the python program for the MIN-MAX algorithm program.

PROCEDURE:-

Imports and Setup:

- Import the required libraries: `math` and `random`.
- Define the simulated annealing function

Initialization:

- Initialize the starting state randomly within a specified range.
- Set the initial temperature.

Annealing Loop:

- Iterate until the temperature reaches a minimum threshold.

Define Cost Function:

- Define the cost function. In this case, it's the Rastrigin function simplified to 1D

Execution and Output:

- Execute the simulated annealing function with the defined parameters and print the optimum state.

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CODING:-

```
import math, random

def simulated_annealing(cost_func, start_temp, cooling_rate):

    state = current = random.uniform(-10, 10)

    temp = start_temp

    while temp > 0.001:

        new_state = current + random.uniform(-1, 1)

        cost_diff = cost_func(new_state) - cost_func(current)
```

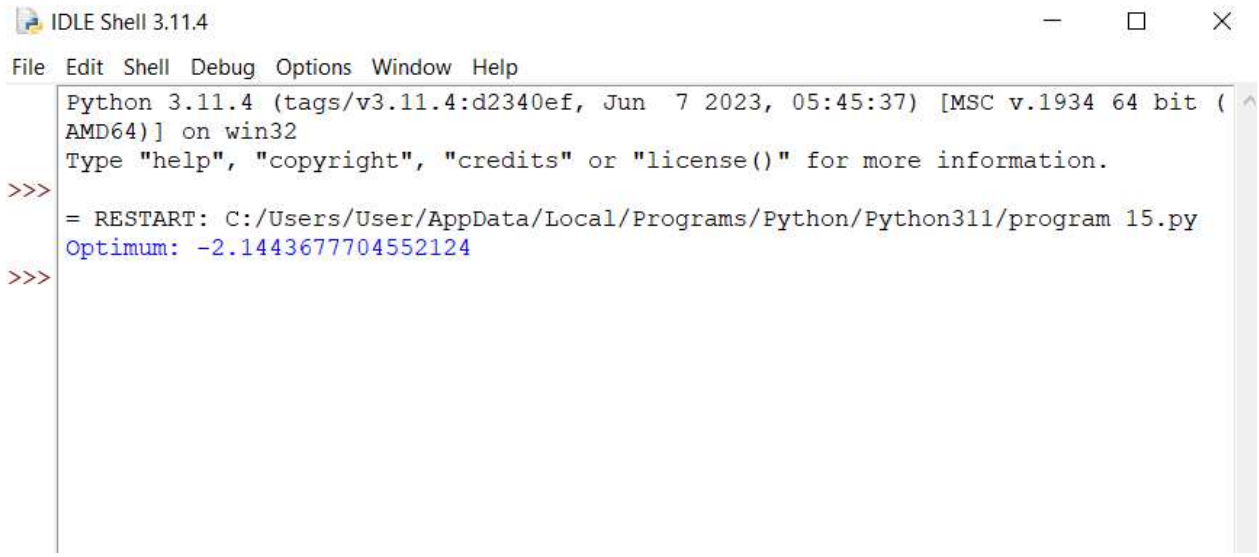
```
        if cost_diff < 0 or math.exp(-cost_diff / temp) > random.random():
            state = new_state
        current = new_state
        temp *= cooling_rate
    return state

cost_func = lambda x: (x ** 2) - (10 * math.cos(2 * math.pi * x)) + 10  # Rastrigin function simplified to 1D

start_temp, cooling_rate = 1000, 0.98

print("Optimum:", simulated_annealing(cost_func, start_temp, cooling_rate))
```

OUTPUT:-



RESULT:-

Hence the program has been successfully executed and verified.