**Exp 1**

**Implementation of Reinforcement Learning System: Agent, Environment, State, Actions, and Reward.**

**Code 1**

import random

class Environment:

    def \_\_init\_\_(self):  # Fixed the init method

        self.state = 0

    def reset(self):

        self.state = 0

        return self.state

    def step(self, action):

        self.state += action

        if self.state == 5:

            reward = 10

            done = True

        else:

            reward = 0

            done = False

        return self.state, reward, done

class Agent:

    def \_\_init\_\_(self):  # Fixed the init method

        self.actions = [-1, +1]

    def select\_action(self):

        return random.choice(self.actions)  # Fixed self.actions

# Initialize the environment and agent

env = Environment()

agent = Agent()

state = env.reset()

done = False

step\_count = 0

print("Starting Episodes")

while not done:

    action = agent.select\_action()

    next\_state, reward, done = env.step(action)

    print(f"step {step\_count}; State={state}, Action={action}, Next State={next\_state}, Reward={reward}")

    state = next\_state

    step\_count += 1

print("Episode Finished")

**Output**

Starting Episodes

step 0; State=0, Action=-1, Next State=-1, Reward=0

step 1; State=-1, Action=1, Next State=0, Reward=0

step 2; State=0, Action=1, Next State=1, Reward=0

step 3; State=1, Action=1, Next State=2, Reward=0

step 4; State=2, Action=-1, Next State=1, Reward=0

step 5; State=1, Action=1, Next State=2, Reward=0

step 6; State=2, Action=-1, Next State=1, Reward=0

step 7; State=1, Action=-1, Next State=0, Reward=0

step 8; State=0, Action=-1, Next State=-1, Reward=0

step 9; State=-1, Action=-1, Next State=-2, Reward=0

step 10; State=-2, Action=1, Next State=-1, Reward=0

step 11; State=-1, Action=-1, Next State=-2, Reward=0

step 12; State=-2, Action=-1, Next State=-3, Reward=0

step 13; State=-3, Action=1, Next State=-2, Reward=0

step 14; State=-2, Action=1, Next State=-1, Reward=0

step 15; State=-1, Action=1, Next State=0, Reward=0

step 16; State=0, Action=-1, Next State=-1, Reward=0

step 17; State=-1, Action=-1, Next State=-2, Reward=0

step 18; State=-2, Action=-1, Next State=-3, Reward=0

step 19; State=-3, Action=1, Next State=-2, Reward=0

step 20; State=-2, Action=1, Next State=-1, Reward=0

step 21; State=-1, Action=-1, Next State=-2, Reward=0

step 22; State=-2, Action=1, Next State=-1, Reward=0

step 23; State=-1, Action=1, Next State=0, Reward=0

step 24; State=0, Action=-1, Next State=-1, Reward=0

step 25; State=-1, Action=1, Next State=0, Reward=0

step 26; State=0, Action=-1, Next State=-1, Reward=0

step 27; State=-1, Action=1, Next State=0, Reward=0

step 28; State=0, Action=1, Next State=1, Reward=0

step 29; State=1, Action=1, Next State=2, Reward=0

step 30; State=2, Action=1, Next State=3, Reward=0

step 31; State=3, Action=-1, Next State=2, Reward=0

step 32; State=2, Action=-1, Next State=1, Reward=0

step 33; State=1, Action=-1, Next State=0, Reward=0

step 34; State=0, Action=1, Next State=1, Reward=0

step 35; State=1, Action=1, Next State=2, Reward=0

step 36; State=2, Action=-1, Next State=1, Reward=0

step 37; State=1, Action=1, Next State=2, Reward=0

step 38; State=2, Action=-1, Next State=1, Reward=0

step 39; State=1, Action=1, Next State=2, Reward=0

step 40; State=2, Action=1, Next State=3, Reward=0

step 41; State=3, Action=-1, Next State=2, Reward=0

step 42; State=2, Action=-1, Next State=1, Reward=0

step 43; State=1, Action=-1, Next State=0, Reward=0

step 44; State=0, Action=1, Next State=1, Reward=0

step 45; State=1, Action=1, Next State=2, Reward=0

step 46; State=2, Action=-1, Next State=1, Reward=0

step 47; State=1, Action=1, Next State=2, Reward=0

step 48; State=2, Action=-1, Next State=1, Reward=0

step 49; State=1, Action=1, Next State=2, Reward=0

step 50; State=2, Action=-1, Next State=1, Reward=0

step 51; State=1, Action=-1, Next State=0, Reward=0

step 52; State=0, Action=1, Next State=1, Reward=0

step 53; State=1, Action=-1, Next State=0, Reward=0

step 54; State=0, Action=-1, Next State=-1, Reward=0

step 55; State=-1, Action=-1, Next State=-2, Reward=0

step 56; State=-2, Action=-1, Next State=-3, Reward=0

**Code 2**

import random

# Define the Environment

class Environment:

    def \_\_init\_\_(self):

        self.state = 0  # Starting position

    def reset(self):

        self.state = 0

        return self.state

    def step(self, action):

        self.state += action

        # Ensure the state doesn't go below 0

        if self.state < 0:

            self.state = 0

        # Define reward logic

        if self.state == 5:

            reward = 10

            done = True

        else:

            reward = 0

            done = False

        return self.state, reward, done

# Define the Agent

class Agent:

    def \_\_init\_\_(self):

        self.actions = [-1, 1]  # Move left or right

    def select\_action(self):

        return random.choice(self.actions)

# Main logic

if \_\_name\_\_ == "\_\_main\_\_":

    env = Environment()

    agent = Agent()

    state = env.reset()

    done = False

    step\_count = 0

    print("Starting Episode...")

    print("Agent starts at position 0. Goal is to reach position 5.\n")

    while not done:

        action = agent.select\_action()

        next\_state, reward, done = env.step(action)

        print(f"Step {step\_count}: State={state}, Action={action}, Next State={next\_state}, Reward={reward}")

        state = next\_state

        step\_count += 1

    print("\nEpisode Finished. Agent reached position 5.")

**Output**

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Starting Episode...

Agent starts at position 0. Goal is to reach position 5.

Step 0: State=0, Action=1, Next State=1, Reward=0

Step 1: State=1, Action=1, Next State=2, Reward=0

Step 2: State=2, Action=1, Next State=3, Reward=0

Step 3: State=3, Action=-1, Next State=2, Reward=0

Step 4: State=2, Action=1, Next State=3, Reward=0

Step 5: State=3, Action=1, Next State=4, Reward=0

Step 6: State=4, Action=1, Next State=5, Reward=10

Episode Finished. Agent reached position 5.

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