EXPERIMENT-6

PROPOSITIONAL LOGIC INFERENCES FOR AI TASKS

AIM:

To implement propositional logic inferences for AI tasks

ALGORITHM:

1. Print the header for the prepositional logic inferences.

2. Define the `negation` function that takes a proposition `p` and returns the negation of `p`.

3. Print the header for the "NEGATION" section.

4. Print the column headers for the truth table of the `negation` function.

5. Iterate over each value of `p` (True, False):

   - Calculate the result of negation using the `negation` function.

   - Print the values of `p` and the calculated result.

6. Define the `conjunction` function that takes propositions `p` and `q` and returns the conjunction (AND) of `p` and `q`.

7. Print the header for the "CONJUNCTION(AND OPERATION)" section.

8. Print the column headers for the truth table of the `conjunction` function.

9. Iterate over each value of `p` (True, False):

   - Iterate over each value of `q` (True, False):

     - Calculate the result of conjunction using the `conjunction` function.

     - Print the values of `p`, `q`, and the calculated result.

10. Define the `disjunction` function that takes propositions `p` and `q` and returns the disjunction (OR) of `p` and `q`.

11. Print the header for the "DISJUNCTION(OR OPERATION)" section.

12. Print the column headers for the truth table of the `disjunction` function.

13. Iterate over each value of `p` (True, False):

    - Iterate over each value of `q` (True, False):

      - Calculate the result of disjunction using the `disjunction` function.

      - Print the values of `p`, `q`, and the calculated result.

14. Define the `exclusive_disjunction` function that takes propositions `p` and `q` and returns the exclusive disjunction (XOR) of `p` and `q`.

15. Print the header for the "EXCLUSIVE DISJUNCTION(XOR OPERATION)" section.

16. Print the column headers for the truth table of the `exclusive_disjunction` function.

17. Iterate over each value of `p` (True, False):

    - Iterate over each value of `q` (True, False):

        - Calculate the result of exclusive disjunction using the `exclusive_disjunction` function.

        - Print the values of `p`, `q`, and the calculated result.

18. Define the `implication` function that takes propositions `p` and `q` and returns the implication of `p` implies `q`.

19. Print the header for the "IMPLICATION" section.

20. Print the column headers for the truth table of the `implication` function.

21. Iterate over each value of `p` (True, False):

    - Iterate over each value of `q` (True, False):

        - Calculate the result of implication using the `implication` function.

        - Print the values of `p`, `q`, and the calculated result.

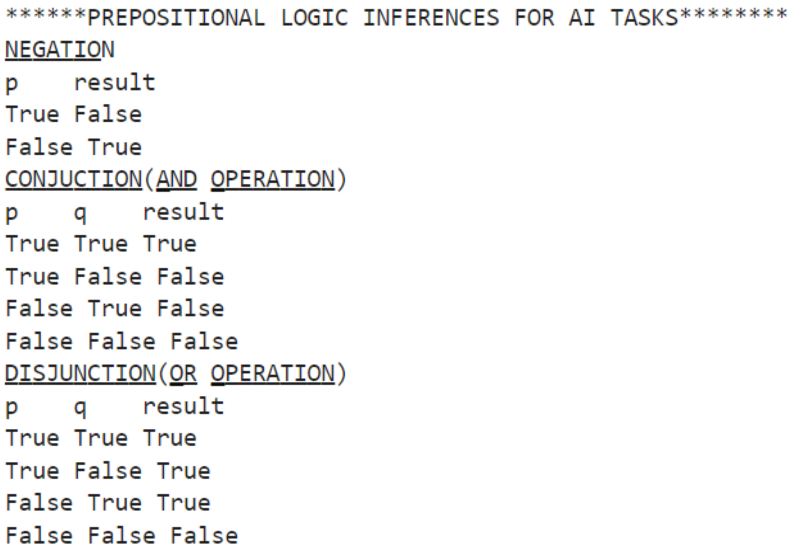
PROGRAM:

```
print("******PREPOSITIONAL LOGIC INFERENCES FOR AI TASKS********")
def negation(p):
    return not p
print("\u0332".join("NEGATION"))
print("p    result")
for p in [True, False]:
    a = negation(p)
    print(p, a)


def conjunction(p, q):
    return p and q
print("\u0332".join("CONJUCTION(AND OPERATION)"))
print("p    q    result")
```

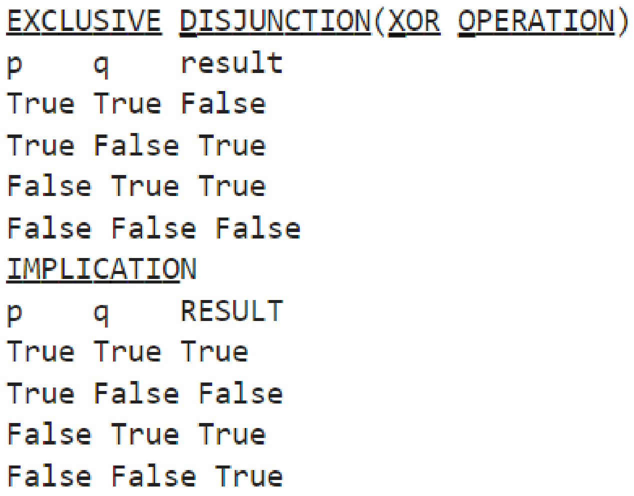
```
for p in [True, False]:
    for q in [True, False]:
        a = conjunction(p, q)
        print(p, q, a)

def disjunction(p, q):
    return p or q
print("\u0332".join("DISJUNCTION(OR OPERATION)"))
print("p    q    result")
for p in [True, False]:
    for q in [True, False]:
        a = disjunction(p, q)
        print(p, q, a)

def exclusive_disjunction(p, q):
    return (p and not q) or (not p and q)
print("\u0332".join("EXCLUSIVE DISJUNCTION(XOR OPERATION)"))
print("p    q    result")
for p in [True, False]:
    for q in [True, False]:
        a = exclusive_disjunction(p, q)
        print(p, q, a)

def implication(p, q):
    return #FIX ME#
print("\u0332".join("IMPLICATION"))
print("p    q    result")
for p in [True, False]:
    for q in [True, False]:
```

```
a = not(p) or q
print(p, q, a)
```

OUTPUT:



```
******PREPOSITIONAL LOGIC INFERENCES FOR AI TASKS********
NEGATION
p    result
True False
False True
CONJUCTION(AND OPERATION)
p    q    result
True True True
True False False
False True False
False False False
DISJUNCTION(OR OPERATION)
p    q    result
True True True
True False True
False True True
False False False
```



```
EXCLUSIVE DISJUNCTION(XOR OPERATION)
p    q    result
True True False
True False True
False True True
False False False
IMPLICATION
p    q    RESULT
True True True
True False False
False True True
False False True
```

RESULT:

The propotional logic inferences for AI tasks are successfully implemented and the output is verified.