VISHWAKARMA INSTITUTE OF TECHNOLOGY
COMPUTER ENGINEERING

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Subject: Artificial Intelligence (AI)

LAB ASSIGNMENT NO – 5

Implementation of predicate logic using PROLOG.

Implementation of an expert system using Prolog means creating a knowledge-based system that uses rules, facts, and inference mechanisms to make decisions or provide expert-level advice in a specific domain.

It allows you to capture complex relationships and perform automated reasoning, making it a powerful tool for creating expert systems.

Code:

```
% Facts
female(mary).
female(lisa).
female(susan).
female(emma).
male(john).
male(david).
male(alex).
male(paul).
parent(mary, david).
parent(alex, david).
parent(alex, lisa).
parent(david, susan).
parent(david, emma).
parent(emma, john).
parent(david, paul).
parent(paul, john).
```

```
% Rules
sister(X, Y) :- parent(Z, X), parent(Z, Y),
    female(X),
    X \== Y.

mother(X, Y) :- parent(X, Y),
    female(X).
father(X, Y) :- parent(X, Y),
    male(X).
brother(X, Y) :- parent(Z, X), parent(Z, Y),
    male(X),
    X \== Y.
```

This Prolog code represents a family tree with facts and rules for defining relationships within the family.

Facts:

The code defines individuals as male or female.

It establishes parent-child relationships in the family tree.

Rules:

- **sister(X, Y):** X is a sister of Y if they share the same parent and X is female.
- **mother(X, Y):** X is the mother of Y if X is the parent of Y and X is female.
- **father(X, Y):** X is the father of Y if X is the parent of Y and X is male.
- **brother(X, Y):** X is a brother of Y if they share the same parent and X is male.

Output:

```
SWI-Prolog (AMD64, Multi-threaded, version 9.0.4)                              —  □  ✕

File  Edit  Settings  Run  Debug  Help
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.

For online help and background, visit https://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?-
% c:/Users/mahaj/OneDrive/Documents/Prolog/file.pl compiled 0.00 sec, 20 clauses

?- sister(lisa,emma).
false.

?- mother(lisa,susan).
false.

?- mother(mary,david).
true
Unknown action: (h for help)
Action? ,

?- sister(susan, emma).
true.

?- ▮
```

```
SWI-Prolog (AMD64, Multi-threaded, version 9.0.4)                              —  □  ✕

File  Edit  Settings  Run  Debug  Help
?-
% c:/Users/mahaj/OneDrive/Documents/Prolog/file.pl compiled 0.00 sec, 20 clauses

?- brother(david,X).
X = lisa.

?- father(alex,david).
true.

?- father(X,john).
X = paul.

?- mother(X,john).
X = emma ,

?- father(david,paul).
true.

?- mother(emma,alex).
false.

?-
```