Artificial Intelligence LAB – 3

AIM: <u>To learn simple input and output predicates in prolog and to build rule based consultation program.</u>

Turbo Prolog has three output predicates: write, writef and writedevice.

Write Predicate:

The write predicate is used to print output to the screen.
The next general form of the write predicate is
     write(E1,E2,E3,…..,En)
Where E1,E2,E3,….En represents Prolog variables or objects of the standard domain types.

For e.g.

Test:-
     write("This is an example"),
     write("of multiple write statements.").

O/P:
     This is an example of multiple write statements.

The writef Predicate.

To format the output with Turbo Prolog, you can use the **writef** built-in predicate to force alignment of numbers or text. The standard form of the writef predicate is

writef(format,E1,E2,E3,……,En)

The variable format is a control code of the type

%m.p
where elements of the code are as follows:

     -     Optional hyphen forcing left justification; default is right justification.
     m   Optional parameter defining minimum field width.
     p   Optional parameter defining the precision of a decimal floating-point
           Number or the maximum string length.

For e.g.
     writef("%-10 #%5.0 $%3.2 \n",fan,23,3.1)
O/P
     fan # 23 $3.10

The readln Predicate :

The readln predicate permits a user to read any string or symbol into a variable.For Example,You can redefine the symptons(Charlie,ferver) .

For example :
     Symptom (Patient,fever) :-
          Write ("Does the ",Patient," have a fever (yes/no)?"),)
          Readln(Reply),
          Reply = "yes".

O/P: Does the ",Patient," have a fever (yes/no)?
Yes ← **this is the input that you provide through your console.**
True

The Readchar Predicate :

You can use the readchar built-in predicate in the same way as

For example :
readln:
Sympton (patient ,fever) :-
Write ("Does ", patient," have a fever(y/n)?"),
Readchar(Replay),
Replay = 'y'.

O/P: Does ", patient," have a fever(y/n)?
Y ← **this is the input that you provide through your console.**
True

The Readint Predicate :

The readint predicate can be used to read an integer value to a   variable.
For example,
Chkage(patient) :-
Write (" What is ",patient," ' s age?"),
Readint(Age),
Age >= 12,
Write (Patient , "Cannot be evaluated with") , nl,
Write("this system . The system is designed "),
Write ("for childhood diseases only").

O/P: What is ",patient," ' s age?
12
Patient , "Cannot be evaluated with
this system . The system is designed for childhood diseases only.
True

The Read real Predicate :

The readreal predicate can be used to read floating point numbers into a variable.For example ,an inventory control system might include the following code ,

Askprice (Item,Price) :-
Write ("what is the price of",item,"?").
readreal (Price)

Consultation Program(s)

Sample Program 1: Medical Diagnosis

```
domains
    disease,indication = symbol
    Patient,name = string

predicates
    hypothesis(string,disease)
    symptom(name,indication)
    response(char)
    go

clauses
    go :-
       write("What is the patient's name? "),
       readln(Patient),
       hypothesis(Patient,Disease),
       write(Patient,"probably has ",Disease,"."),nl.

    go :-
       write("Sorry, I don't seem to be able to"),nl,
       write("diagnose the disease."),nl.

    symptom(Patient,fever) :-
       write("Does ",Patient," have a fever (y/n) ?"),
       response(Reply),
       Reply='y'.

    symptom(Patient,rash) :-
       write("Does ",Patient," have a rash (y/n) ?"),
       response(Reply),
       Reply='y'.

    symptom(Patient,headache) :-
       write("Does ",Patient," have a headache (y/n) ?"),
       response(Reply),
       Reply='y'.

    symptom(Patient,runny_nose) :-
       write("Does ",Patient," have a runny_nose (y/n) ?"),
       response(Reply),
       Reply='y'.
```

```prolog
symptom(Patient,conjunctivitis) :-
   write("Does ",Patient," have a conjunctivitis (y/n) ?"),
   response(Reply),
   Reply='y'.

symptom(Patient,cough) :-
   write("Does ",Patient," have a cough (y/n) ?"),
   response(Reply),
   Reply='y'.

symptom(Patient,body_ache) :-
   write("Does ",Patient," have a body_ache (y/n) ?"),
   response(Reply),
   Reply='y'.

symptom(Patient,chills) :-
   write("Does ",Patient," have a chills (y/n) ?"),
   response(Reply),
   Reply='y'.

symptom(Patient,sore_throat) :-
   write("Does ",Patient," have a sore_throat (y/n) ?"),
   response(Reply),
   Reply='y'.

symptom(Patient,sneezing) :-
   write("Does ",Patient," have a sneezing (y/n) ?"),
   response(Reply),
   Reply='y'.

symptom(Patient,swollen_glands) :-
   write("Does ",Patient," have a swollen_glands (y/n) ?"),
   response(Reply),
   Reply='y'.

hypothesis(Patient,measles) :-
   symptom(Patient,fever),
   symptom(Patient,cough),
   symptom(Patient,conjunctivitis),
   symptom(Patient,runny_nose),
   symptom(Patient,rash).

hypothesis(Patient,german_measles) :-
   symptom(Patient,fever),
   symptom(Patient,headache),
   symptom(Patient,runny_nose),
```

```prolog
        symptom(Patient,rash).

    hypothesis(Patient,flu) :-
        symptom(Patient,fever),
        symptom(Patient,headache),
        symptom(Patient,body_ache),
        symptom(Patient,conjunctivitis),
        symptom(Patient,chills),
        symptom(Patient,sore_throat),
        symptom(Patient,runny_nose),
        symptom(Patient,cough).

    hypothesis(Patient,common_cold) :-
        symptom(Patient,headache),
        symptom(Patient,sneezing),
        symptom(Patient,sore_throat),
        symptom(Patient,runny_nose),
        symptom(Patient,chills).

    hypothesis(Patient,mumps) :-
        symptom(Patient,fever),
        symptom(Patient,swollen_glands).

    hypothesis(Patient,chicken_pox) :-
        symptom(Patient,fever),
        symptom(Patient,chills),
        symptom(Patient,body_ache),
        symptom(Patient,rash).

    hypothesis(Patient,measles) :-
        symptom(Patient,cough),
        symptom(Patient,sneezing),
        symptom(Patient,runny_nose).

    response(Reply) :-
        readchar(Reply),
write(Reply),nl.
```

Exercise Program 2: Predict user's nature based on colour user likes.

Flow: Take user's name and asks for his/ her favourite colour using interactive questionnaire. Characteristic of colours are given below based on that predict user's nature (i.e. aggressive, imaginative, cooperative, creative, introspective, affectionate, etc…)

RED

It shows that you are very social, assertive & energetic. But at the same time, you are also moody and impulsive. You feel deep sympathy for fellow human beings and are easily swayed. You are an optimist, but you are also a complainer and do not desist from voicing your complaints or discomforts.

ORANGE

You are good natured, enjoy being with others and are swayed by outside opinions. You do good work, have strong loyalties, and are very good at heart.

YELLOW

You are very imaginative and have a strong urge to help the world. You are inclined to speak of lofty ideas without applying them in practical. Secretly, you are shy, wish to be respected, crave admiration for your wisdom and are a mental loner. You are a safe friend in whom people can confide their secrets and problems.

GREEN

You are a good citizen and a pillar of the community and are sensitive to social customs and etiquette. You are frank, moral and reputable. You make yourself a splendid teacher and feel deep affection for your family.

BLUE

You are deliberate and introspective. You have conservative convictions and retreat to gentler surroundings in times of stress, but are sensitive to the feelings of others. You keep a tight rein on your passions and enthusiasms, are a loyal friend and lead a sober life. You nourish big dreams but do not act on them. Stupidity in others annoys you, as does superior intelligence.

PURPLE

You have a good mind, a ready wit and an ability to observe things that go unnoticed by others. You get angry easily. You display fine-arts creativity and appreciate the subtle but recognize the magnificent.

BROWN

You perform your duties very well, are clever with money matters, stubborn in your habits and convictions. You are dependable and steady, dislike impulsiveness and can bargain very well.

GREY

You are cautious, try to strike a compromise in most situations. You encounter and seek composure and peace. You try very hard to fit yourself into a mould of your own design.

BLACK

You are above average, worldly, conventional, proper, polite and regal. Black is a colour that means one thing (depression) to the clinical psychiatrist and quite another (dignity) to you.

Exercise Program 3: Predict user's health based on habits user practices.

Flow: Take user's name and asks yes/no for regular habits. Based on habits user follows regularly predict user's health.

Health is considered to be bad if

- User has habit of regular smoking.

- User has habit of excessive drinking regularly.

- User has habit of taking drugs.

- User has habit of eating oily food and taking too much sugar with foods.

- User acts like an owl (i.e. Sleep hours are quite less).

Health is considered to be good if

- User has habit of drinking milk regularly and User has habit of eating green vegetables and or eggs in meal and User has habit of drinking enough water during day.

- User has habit of regular exercise and regular sufficient sleep hours and regular walk.

- User has habit of brushing teeth and washing hair and using showers regularly

Health is considered to be moderate if

- User has habit of eating oily food and having regular walk.

- User has habit of food with excessive sugar and having regular walk.

- User has habit of eating oily food and doing regular exercise.

- User has habit of eating food with excessive sugar and taking walk.