THE OPEN UNIVERSITY OF SRI LANKA
B.Sc DEGREE PROGRAMME: LEVEL 04

CLOSED BOOK TEST: 2015/2016

CSU 2280: DEDUCTIVE REASONING AND PROLOG FOR ARTIFICIAL INTELLIGENCE

DURATION: **ONE AND HALF HOURS** (1 ½ HOURS)

Date: **14th May, 2016** Time: **10.30 am – 12.00 noon**

Answer ALL questions.

Q1.

a) Briefly describe the following terms in Prolog.

i. Atom

ii. Variable

iii. Operators

iv. Predicates

b) Consider the following Prolog predicates to answer the questions from (b) (i) to (b) (v).

```
parent (saman, sunil).
parent (sunil, ruwan).
parent(kamala, ruwan).
parent(mala, sunil).
male(saman).
male(sunil).
male(ruwan).
female(mala).
female(kamala).
```

i. Briefly describe the meaning of the Prolog predicate `parent(X,Y).`

ii. Define a Prolog predicate `mother/2` to get mother's name for a given child.

iii. Define a Prolog predicate `child/2` to get child's name for a given parent.

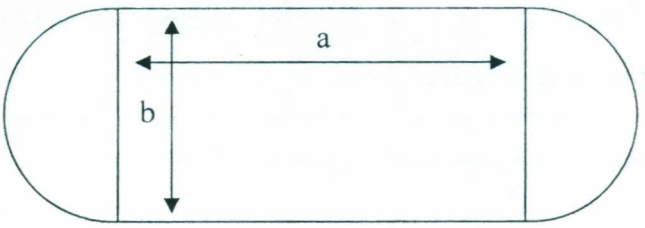
iv. Define a Prolog predicate `grandfather/2` to get grandfather's name for a given child.

v. Briefly explain how will Prolog answer the following queries.

```
?- grandfather(ruwan,Y).
?- grandfather(X, ruwan).
```

Q2.

a) Write a Prolog program to calculate the area of the following figure. (a and b are inputs)



b) Create a Prolog rule to display the grade of the given mark using *if condition*. (Use the following defined ranges of marks.)

M >= 70 A, 70 > M >= 60 B, 60 > M >= 50 C, 50 > M >= 40 S, 40 > M F

c) Create Prolog rules to carry out the following list operations.

i. Print a given list into its reverse order.
ii. Display the average value of the given number list.

Q3.

a) Briefly explain the following terms in Prolog.

i. `retractall/1`
ii. `bagof/3`
iii. `assert/1`

b) Implement the following table as a Prolog database.

Index No.	Name	Age	Sex
A0011	S. K. Kumarage	34	M
A0012	M. S. Siripala	22	M
A0013	N. S. Amaraweera	41	F
A0014	R. T. Kulasingha	28	F

Table 1: Student Information

c) Create Prolog rules to implement the following operations.

i. Add a new student
ii. Delete an existing student
iii. Update an existing student of a given index number.