



UNIVERSITY EXAMINATIONS

**EXAMINATION FOR SEPTEMBER/DECEMBER 2019/2020 FOR THE BACHELOR OF
SCIENCE IN COMPUTER SCIENCE**

RCS 421: INTRODUCTION TO COGNITIVE SCIENCE

DATE: 19TH DECEMBER 2019

TIME: 2 HOURS

GENERAL INSTRUCTIONS:

Students are NOT permitted to write on the examination paper during examination time.

This is a closed book examination. Text book/Reference books/notes are not permitted.

SPECIAL INSTRUCTIONS:

This examination paper consists Questions in Section A followed by section B.

Answer Question 1 and any Other Two questions.

QUESTIONS in ALL Sections should be answered in answer booklet(s).

1. **PLEASE** start the answer to EACH question on a **NEW PAGE**.
2. **Keep your phone(s) switched off at the front of the examination room.**
3. **Keep ALL bags and caps at the front of the examination room and DO NOT refer to ANY unauthorized material before or during the course of the examination.**
4. **ALWAYS** show your working.
5. **Marks indicated in parenthesis i.e. () will be awarded for clear and logical answers.**
6. **Write your REGISTRATION No. clearly on the answer booklet(s).**
7. **For the Questions, write the number of the question on the answer booklet(s) in the order you answered them.**
8. **DO NOT use your PHONE as a CALCULATOR.**
9. **YOU are ONLY ALLOWED to leave the exam room 30minutes to the end of the Exam.**
10. **DO NOT write on the QUESTION PAPER. Use the back of your BOOKLET for any calculations or rough work.**

SECTION A: Answer ALL questions in this section.

Question 1 (30 marks)

- (a) Define the following terms:
(i) Cognitive Science
(ii) Logic
(iii) Syllogism (3 marks)
- (b) Consider the following statement:
All computer science students at Riara university end up becoming ICT managers.
Use suitable logic symbols to represent of the following scenario:
If Tommy is a Riara University student but does not take computer science, then he does not become an ICT manager. (5 marks)
- (c) (i) Explain the term intelligence as used in cognitive science. (2 marks)
(ii) Describe any five elements that constitute intelligent behavior. (10 marks)
- (d) (i) State what you understand by the terms Turing Test. (2 marks)
(ii) With the use of a suitable diagram, describe the Turing Test in details. (8 marks)

SECTION B: Answer any two questions in this section

Question 2 (20 marks)

- (a) Define the term agent as used in cognitive science. (2 marks)
- (b) Using a diagram, describe in details the operational characteristics of an agent. (10 marks)
- (c) (i) In as far as agents are concerned, explain the meaning of the following statement:
[f: $P^* \rightarrow A$]. (6 marks)
(ii) State what you understand by a rational agent. (2 marks)

Question 3(20 marks)

- (a) Differentiate propositional from predicate logic, giving an example of each. (4 marks)
- (b) Using diagrams, illustrate and describe the steps used in the following reasoning methods:
(i) Inductive
(ii) Deductive (10 marks)
- (c) Give two examples of each of the reasoning methods highlighted in (b) above. (4 marks)
- (d) Define abductive reasoning. (2 marks)

Question 4 (20 marks)

Describe the characteristics of each of the following areas used in cognitive science, in details, giving and justifying and application area of each:

- (i) Expert System
- (ii) Virtual Reality
- (iii) Pattern Recognition
- (iv) Data Mining

Question 5 (20 marks)

- (a) (i) PROLOG is one of the programming languages used in cognitive science. Name any other two examples of such programs. **(2 marks)**
- (i) Write a simple program (or algorithm) in Prolog, to display the statement:
“Introduction to Cognitive Science” **(4 marks)**
- (b) (i) Differentiate rules and facts in prolog programming, giving an example of each. **(4 marks)**
- (iv) Describe the meaning of each of the following prolog programming clauses
mother_child(trude, sally).
father_child(tom, sally).
father_child(tom, erica).
father_child(mike, tom).
sibling(X, Y) :- parent_child(Z, X), parent_child(Z, Y).
parent_child(X, Y) :- father_child(X, Y).
parent_child(X, Y) :- mother_child(X, Y). **(10 marks)**