Riara University

UNIVERSITY EXAMINATIONS
EXAMINATION FOR 2019 /2020 FOR BACHELOR OF SCIENCE IN COMPUTER SCIENCE & BACHELOR OF BUSINESS INFORMATION TECHNOLOGY
RCS309: ARTIFICIAL INTELLIGENCE

DATE: 10ᵀᴴ DECEMBER 2019   **TIME: 2 HOURS**

GENERAL INSTRUCTIONS:
Students are NOT permitted to write on the examination paper during reading 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 (Compulsory-30Marks)

QUESTION ONE

a) Views of AI fall into four categories, Name and explain the four categories

(4 Marks)

b) Human beings can carry out perceptual tasks. Give two examples. **(4 Marks)**

c) What is meant by "first order predicate calculus" or "first order logic" **(2 Marks)**

d) Explain the importance of Artificial Intelligence in Industry and the Military using one example or reason in each case. **(4 Marks)**

e) Describe what is meant by the expressions **(6 Marks)**

(i) Guided Search

(ii) Breadth first search,

(iii) Depth first search.

f)

   i. State any two methods that are used in solving problems in artificial intelligence **(3 Marks)**

   ii. Describe the main feature of any one of the methods that you have stated**.**

(3 Marks)

g) Describe the forward chaining and backward chaining inference control mechanism. **(4 Marks)**

h) Answer the following questions by indicating whether the statements are True (T) or False (F). **(4 Marks)**

   i. Depth-first search is often slower than Breadth-first search.

   ii. Draughts (checkers) and Scrabble are both deterministic games.

   iii. When playing games, the horizon effect can be solved by limiting the search depth.

   iv. "Two primary school children, Dennis and Sarut are playing the Tic-tac-toe game. Dennis makes the first move (starts the game)."The minimum number of moves Sarut could make is 2 for Dennis to win the game.

i) Use one ground to explain why artificial intelligence is relevant to developing country

(2 Marks)

SECTION B (Optional 2 out of 4)

QUESTION TWO (Optional, 15 Marks).

a) Discuss why psychology may be regarded as a foundation of Artificial Intelligence.

(4 Marks)

b) Describe one advantage and one disadvantage of exhaustive search as a problem solving technique.

(2 Marks)

c) Show how a search problem definition is specified. **(3 Marks)**

d) Describe the best-first search heuristic using an example. Explain why you would recommend such a search method. **(4 Marks)**

e) State any two real life applications of the search technique. **(2 Marks)**

QUESTION THREE (OPTIONAL, 15 MARKS).

a) What is knowledge acquisition? **(2 Marks)**

b) Describe the knowledge acquisition process. **(3 Marks)**

c) Name two methods of knowledge elicitation **(2 Marks)**

The Chinese Room

- Human who knows only English; stacks of paper with Chinese symbols; rule book in English, stating which bit of paper to give in response to a given (Chinese) input.
- Human who knows only Chinese on outside of room; passes in Chinese query, Receives Chinese response.

 While this system would likely pass the Chinese Turing test.. it is clearly problematic.

 This example is used as a counter argument to the idea that machines can actually think.

 The argument goes like this:

1. Certain kinds of objects are incapable of conscious understanding (of Chinese).
2. The human, paper and rule book are objects of this kind.
3. If each of a set of objects is incapable of conscious understanding (of Chinese),
4. then any system constructed from the objects is incapable of conscious understanding (of Chinese).
5. Therefore there is no conscious understanding (of Chinese) inside the Chinese room.

    i.   What step (1-4 above) is problematic? Why? **(4 Marks)**

ii.   At a higher level, the 'rule book' plus inputs and actions clearly fit into our basic framework of an 'Agent'. However we are missing a crucial technique in AI, learning. If the agent/human inside of the chinese room had an english-to-chinese dictionary how does this further damage the above argument? What part or parts?

(4 Marks)

QUESTION FOUR (OPTIONAL, 15 MARKS).

a) Explain the meaning of the term 'Expert System'   **(1 Marks)**

b) Draw a labelled diagram showing the main parts of an expert system   **(5 Marks)**

c) Outline any three classical problems addressed by expert systems   **(3 Marks)**

d) Suppose that you set out to develop an expert system application. Outline any two steps that you would take to ensure that you succeed.   **(4 Marks)**

e) Describe one function of internet-based software agents   **(2 Marks)**

QUESTION FIVE (OPTIONAL, 15 MARKS).

a) Define the term' robot'.   **(2 Marks)**

b) List any three grounds showing why we should have robots.   **(3 Marks)**

c) Translate the following into predicate calculus (first order logic) using the predicates provided.
    i.   "Every person is loved by some other person"
    ii.   "A bus took all the RCS309 students to one of the stations in Nairobi"

(4 Marks, 2 marks each)

d) Use a diagram to describe a structure of a learning system.   **(4 Marks)**

e) State any TWO techniques used in Machine Learning.   **(2 Marks)**