FACULTY OF SCIENCE

| ACADEMY OF COMPUTER SCIENCE AND SOFTWARE ENGINEERING |
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| MODULE          IT00097/IT08X97<br>                     ARTIFICIAL INTELLIGENCE<br>CAMPUS          APK<br>EXAM               JUNE 2016 EXAMINATION |

DATE:    2016/06/06                                    SESSION:  08:30 – 10:30

ASSESSOR(S)                                              Prof EM Ehlers

EXTERNAL MODERATOR                           Dr WJC van Staden (UNISA)

DURATION:      2 Hours                              MARKS:          100

THIS PAPER CONSISTS OF TWO (2) PAGES INCLUDING THE COVER PAGE

INSTRUCTIONS:
1. Answer **ALL** the questions.

QUESTION 1

Consider the following agent-oriented suite of tools:
  A suite of tools implemented using intelligent agents to facilitate the development of a software system for either:
    • The coordination of a band consisting of robots playing musical instruments
    • Controlling a terrain exploring robot for a remote planet
Your answer must address agent technology as well as only two of the following sub disciplines of Artificial Intelligence.
    ▪ Search strategies
    ▪ Robotics
    ▪ Learning or classical planning or natural language processing or computer vision.
Give as complete as possible a semantic network describing:
  a) All the components you consider that the suite of tools should consist of i.e. the different tools you have identified as well as the functionality of each.
  b) The agent types that could be used to realize the tools in (a) above.
  c) All the aspects of the 3 sub disciplines of Artificial Intelligence that you consider to be important in developing the suite of tools. (Agent technology plus any 2 of the sub disciplines listed above).
  d) The resultant semantic network should at the minimum contain at least 80 concepts. Furthermore no particular discipline should be represented by more than 30 concepts.

Give at least 20 definitions of key concepts as well as the motivation for including those concepts where you deem necessary.

[50]

QUESTION 2

Consider any one of the agents in the suite of tools in Question 1
  a) Specify the task environment of the agent by giving a PEAS description for the agent.          (4)
  b) Briefly discuss any 5 of the task environment specified above.
     Motivate your choice of each property.                                                        (10)

[14]

QUESTION 3

Briefly discuss genetic algorithms as a variant of local beam search.

[10]

QUESTION 4

Considering adversarial search; briefly discuss stochastic games.

[10]

QUESTION 5

  a) Define constraint satisfaction problems                                                        (4)
  b) Give a precise formulation for the following as a constraint satisfaction problem.             (4)
     "Class scheduling: There are a fixed number of professors and classrooms, a list of classes to be offered, and a list of possible time slots for classes. Each professor has a set of classes that he or she can teach."

[8]

QUESTION 6
Identify the two issues you deem most important when considering the ethics and risks of developing artificial intelligence. Discuss each briefly.

[8]

TOTAL:          [100]