Uva Wellassa University, Sri Lanka
End Semester Examination – January 2010
ENG 406-2 Artificial Intelligence & Robotics

Time: Two (02) hours

Total **04** Questions

Answer **ALL** the questions

If you have any doubts to the interpretation of the wording of a question, make your own decision, but clearly state it on your answer script.

The maximum marks attainable are indicated in the brackets.

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01) Explain the following concepts in brief

I. Natural Intelligence and Artificial Intelligence.
(25 marks)

II. Performance-Environment-Actuators-Sensors.
(25 marks)

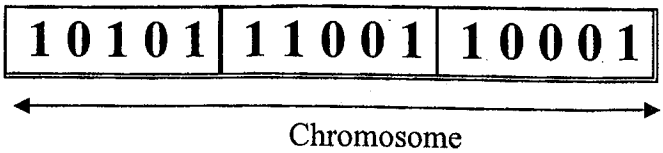
III. Turing Test as applied to AI Agent Development
(15 marks)

IV. Duplication of Intelligence.
(15 marks)

V. Natural Intelligence in real world insect examples.
(20 marks)

02) I. In nature, evolution took billions of years to create animals with complex intelligence. Scientists basically developed genetic algorithms (GA) for optimization and learning purposes. What are the basic operations associated with GA?
(15 marks)

II. Explain all the operations in part (I) with the aid of following binary codes of a three variable optimization problem. (30 marks)



Chromosome

III. Figure Q2 shows the evolution process of the above optimization process using GA. Answer the following questions with NO MORE THAN THREE WORDS.

a. Number of iterations
b. Optimum value of the fitness function
c. Type of optimization

(10 X 3 marks)

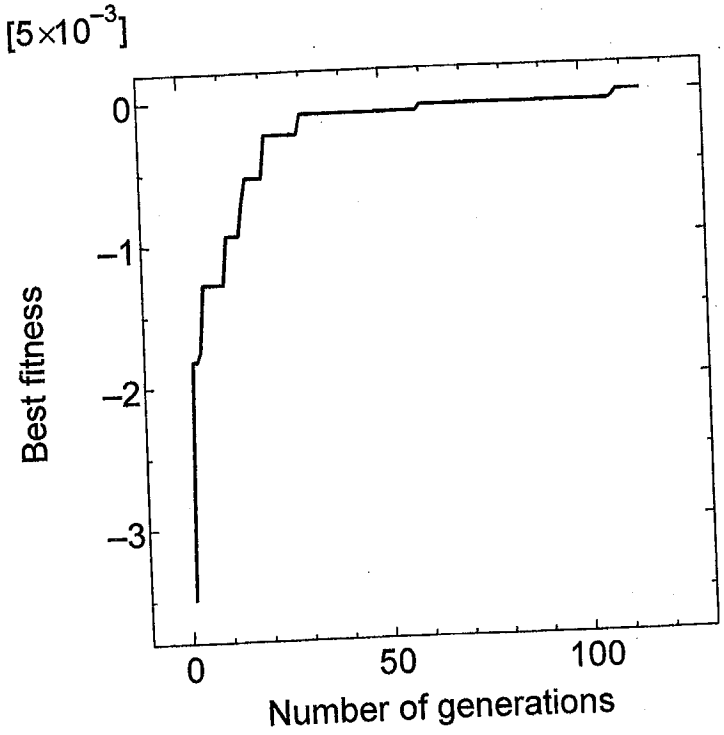


Figure Q2

IV. Briefly explain the applications of evolutionary computation. (25 marks

03) I. Figure Q3 shows a Latin square with partial assignment of colors (Latin square v 10 Colors in this case). Write an algorithm for completing this classical problen Quasi-group. (35 mark

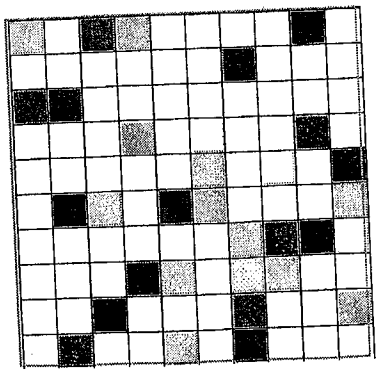


Figure Q2

II. How do you apply "Depth-first-search" algorithm for PART I (in Question 3) in order to find a real time solution? You may use MATLAB codes to provide a solution.

(65 marks)

04) Robotics has been of interest to mankind for over one hundred years or even more.

I. What are the applications of present-day robotics research?

(20 marks)

II. Define semi-autonomous and give an example of it.

(20 marks)

III. Define fully-autonomous and give an example of it.

(20 marks)

IV. Explain the term "Degree-of-freedom" (DOF) as applied to humanoid robots.

(25 marks)

V. What are the possible sensors needed for navigating through an unknown environment if it uses the robot in PART IV?

(15 marks)