EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

THIRD EXAMINATION IN SCIENCE -2010/2011

FIRST SEMESTER (Mar/Apr., 2013)

CS304 – ARTIFICIAL INTELLIGENCE

(PROPER AND REPEAT)

Answer all questions | Time allowed: 02 Hours

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1)

i. Define the term Artificial intelligence.

ii. State the different approaches in defining artificial intelligence.

iii. Suppose you design a machine to pass the Turing test. What are the capabilities such a machine must have?

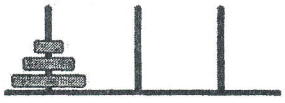
iv. Describe the term '*State Space notation*' in Artificial Intelligence.

v. Give the initial state, goal state, successor function, and cost function for each of the following:

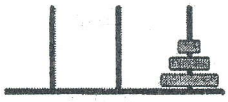
a) You have to colour a planar map using only four colours, in such a way that no two adjacent regions have the same colour,

b) In the travelling sales person problem (TSP) there is a map involving N cities some of which are connected by roads. The aim is to find the shortest tour that starts from a city, visits all the cities exactly once and comes back to the starting city.

vi. There are 3 disks of different sizes and three pegs. Initially all disks are stacked on one peg with the smallest on the top and the largest at the bottom. The problem is to move entire stack from one peg to another that only one disk can be moved at a time and no disk may be placed on top of a smaller one. Find out the possible moves from initial state to goal state.



Initial state



Goal state

2)

i. Describe the term *Heuristic Search.*

ii. List out different types of Heuristic Search Techniques.

iii. Write down the algorithm for Generate-and-Test.

iv.

a) State the term '*Best – First*' Search;
b) State the use of following List OPEN and CLOSED;
c) State *Means – Ends Analysis;*
d) Show how Means- Ends Analysis could be used to solve the problem of getting from one place to another, explain it with the example of robot navigation, state necessary operators, preconditions and results.

v. Briefly explain about AO* Algorithm with suitable Example.

3)

i. Define the term *Knowledge.*

ii. Briefly explain two different kinds of entities used in Knowledge Representations and Mapping.

iii. Define the term *Inheritable Knowledge.*

iv. Write down the difference between *Inheritable Knowledge* and *Procedural Knowledge.*

v. Listout some standard logic symbols in Representation of Facts in Predicate Logic.

vi. Consider the following statements:

- Wonder is a name of a dog.
- All dogs belong to the class of animals.
- All animals either live on land or in water.

a) Translate these sentences into formulas in Predicate Logic.

b) What we can infer from these statements.

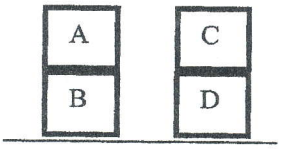
4)

i. Define Planning.

ii. Briefly explain about the components of a *Planning System*.

iii. Write down the actions that can be performed when manipulating the robot navigation.

iv. Consider the following blocks world problem.



INITIAL STATE

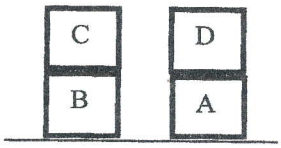
ON (A,B) ∧

ON (C,D) ∧

ONTABLE (B) ∧

ONTABLE (D) ∧

ARMEMPTY



GOAL STATE

ON (C,B) ∧

ON (D,A) ∧

ONTABLE (B) ∧

ONTABLE (A)

Show how *Goal Stack Planning* may be used to solve the above block world problem.