NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2005

SUBJECT: EXPERT SYSTEMS
CODE: SCS4211

INSTRUCTIONS TO CANDIDATES

This paper consists of **SEVEN** questions. You are required to answer a total of **FIVE** questions.
Answer all questions in **SECTION A** and Chose any **FOUR** questions from **SECTION B**.

Time: 3 hours

SECTION A

QUESTION ONE

a) Consider the 8-puzzle state space problem generated by moving the blank. Given the initial state and the goal state below, generate the state space in heuristic search.

Initial State

2	8	3
1	6	4
7	■	5

Goal state

1	2	3
8	■	4
7	6	5

[12]

b) Briefly explain what you understand by an ODYSSEUS system. The ODYSSEUS's apprenticeship learning strategy breaks down into three phases. Briefly explain those phases. [8]

SECTION B
QUESTION TWO

a)   What is meant by Conflict Resolution in a Production System? Describe three possible Conflict Resolution Strategies and explain why more than one conflict resolution strategy is usually needed.   [10]

b)   Explain Backtracking   [5]

c)   Distinguish between **deductive** and **inductive** reasoning   [5]

QUESTION THREE

Consider the following variables:

A=Have $10 000 000
B=Younger than thirty
C= Education at college level
D=Annual income of at least $40 000 000
E=Invest in securities
F=Invest in growth stocks
G=Invest in kingdom stock.

Each of these variables can be answered as *true* (yes) or *false* (no).

The facts: Let us assume that an investor has $10 000 000 and she is twenty-eight years old. She would like advice on investing in Kingdom Stock.

The rules: Let us assume that our knowledge base includes the following five rules:

R1:IF a person has $10 000 000 and she has a college degree, **THEN** she should invest in securities.

R2:IF a person's annual income is at least $40 000 000 and she has a college degree, **THEN** she should invest in growth stocks.

R3:IF a person is younger than thirty and if she is investing in securities, **THEN** she should invest in growth stocks.

R4:IF a person is younger than thirty, **THEN** she has a college degree.

R5: **IF** a person wants to invest in growth stock, **THEN** the stock should be Kingdom.

Questions

a) Inferencing with Backward Chaining, advise the Investor whether to invest in Kingdom stock or not. [15]

b) Define the following terms

   i. Knowledge Engineering [2]
  ii. Deep Knowledge [2]
 iii. Inference Engine [1]

QUESTION FOUR

a). A major difference between a conventional decision support system and ES is that the former can explain a **'how'** question whereas the latter can also explain a **'why'** question. Discuss. [14]

b) The best-first method is described as **'greedy'.** Explain why. [5]

c). What do you understand by the term **'meta -knowledge'**? [1]

QUESTION FIVE

a). Why did the General-purpose Problem Solver fail? [5]

b). Development and consultation are two of the three major activities that are part of ES construction and use. Discuss the two. [10]

c). Explain how software packages EMYCIN and MYCIN are related. [5]

QUESTION SIX

a) Describe the components of Blackboard Architecture. [6]
b) Compare and Contrast Hill-Climbing and Depth-first search. [8]
c) What are the differences between Domain-Specific tools and General-purpose tools in Expert Systems? [6]

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