Final Exam
Second Semester Session 2011/2012

Course Code / Name: STIN2103 Knowledge Engineering and Expert System
Date: 7 June 2012 (Thursday)
Time: 2.30 P.M. - 5.30 P.M. (2 1/2 Hours)
Venue: BK2 (FPAU)

Instruction:
1. This exam paper contains TWELVE (12) questions in NINE (9) printed pages, excluding the cover page.
2. Answer ALL QUESTIONS in the space provided.
3. You are NOT ALLOWED to remove the exam paper from the examination hall.

Matric No: ____________________________  (with word)  ____________________________  (with number)
Identification Card No: ____________________________  ____________________________
Lecturer: ____________________________
Group: ______ TABLE No.: __________

Do not open this examination paper until instructed.

Confidential
1. “Expert system is an intelligent computer program that uses knowledge and inference techniques to solve problems that are difficult enough to require human expertise for their solutions.” Explain **THREE (3)** characteristics that show the intelligent parts of expert system.  
(6 marks)

2. Write the following in Predicate Calculus.
   a) All dogs are mammals.  
   (2 marks)

   b) No dog is an elephant.  
   (2 marks)

   c) Some programs have bugs.  
   (2 marks)

   d) None of my programs have bugs.  
   (2 marks)

   e) All of your programs have bugs.  
   (2 marks)
3. In your own words, explain briefly how expert system technique can be implemented in this area:
   a) Expert system in emotion recognition
      (3 marks)
   
   b) Expert system in speech recognition
      (3 marks)
   
   c) Expert system in Robotic
      (3 marks)
   
4. Expert system is a program that developed to mimic a human problem solving strategies. Explain briefly THREE (3) participants involved in developing an expert systems.
   (6 marks)
5. Based on the passage below, answer the following questions.

Max is a seagull. Like all birds, seagulls have two wings and can fly. They love to eat fish. Max has a friend named Jack, a penguin. Even though penguins are also birds, they cannot fly. Instead, they walk. Penguins can only survive at places with cold temperature. Just like seagulls, their major source of food is fish which they caught in the icy cold water where they live.

a) Briefly explain the concept of inheritance in frame.

(3 marks)

b) Represent the information on Max, a seagull, in a frame.

(4 marks)
6. The most critical steps in developing expert systems is identifying the suitable problem. What does it mean by "suitable problem"? Explain briefly.

(4 marks)
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7. The goal of this project is to develop a consumer-lending expert system to guide the user through the decision for making an automobile loan. The system asks the user a series of questions that can vary depending on the customer's situation. This includes the customer's financial and employment record, past loan record, and the price of the automobile. The system then provides a decision based on the answers to these questions, using the bank’s lending experience. The rules are based partly on policies set by the organization and partly on common lending practices.

You have been assigned the task of building the automobile load advisor for the bank. Explain in detail SIX (6) phases of Expert System Development Life Cycle according to the situation given. 

(12 marks)
8. After developing an expert system, how do you determine that your expert system is a success? 

(4 marks)

9. "The elderly use the health services heavily (Hunt, 1973). Discharge planning for the elderly patient needs to be performed successfully if the hospital and community services are to cope with a growing aged section of the population. To ensure a successful hand-over of care from the hospital to home, a large number of factors usually have to be considered in planning discharges. Many professions and services may be involved in a particular case, including occupational therapy, physiotherapy, health visiting, community nursing, social services provision, the Department of Health and Social Security, voluntary bodies, and the patient's family and friends (Skeet, 1985). Surveys have shown that discharge planning is one of the weakest aspects of hospital care (Moores, 1986; Skeet, 1974). Poor planning can result in anything from the GP not being informed of the patient's return home, to a patient being passed on a stretcher through a window because nobody arranged for the ambulance crew to have keys to the house."

General Manager of Llanelli Bryntirion Hospital proposed some kind of computerized information system that could be employed to assist nurses in discharge planning procedures for the elderly.

a) Is the problem above suitable for developing an expert system? Why? 

(3 marks)

b) From the case study above, determine what is (i) problem domain and (ii) problem statement. 

(4 marks)
c) Based on the case study above, state who is the expert that you have to meet to get the knowledge? Explain why. 
(3 marks)

d) Give FOUR (4) characteristics of (i) expert (ii) knowledge engineer 
(8 marks)
11. Given fuzzy set for linguistic variable tspeed below. Find:

\[ A = (0.1/1, 0.3/2, 0.7/3, 1.0/4, 0.6/5, 0.2/6, 0.1/7) \]
\[ B = (0.2/1, 0.8/2, 1.0/3, 0.6/4, 0.4/5, 0.3/6, 0.1/7) \]

a) \( \text{INT} (A) \)  

(3 marks)

b) \( \text{CON} (B) \)  

(3 marks)

c) \( \text{DIL} (A) \)  

(3 marks)

d) \( \text{Very very very} (A) \)  

(3 marks)
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12. Some people say that expert system is the worst technology ever discovered in artificial intelligence area. What do you think and explain.

(8 marks)