**UNIVERSITY OF GHANA**



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**BA / BSC SECOND SEMESTER UNIVERSITY**

**EXAMINATIONS:**

**2010/2011**

**COMPUTER SCIENCE**

**COMP412 - INTRODUCTION TO EXPERT SYSTEMS**

**( 3 CREDITS)**

EXAMINER: J.K. ECKLU

TIME ALLOWED : TWO AND HALF ( 2 % ) HOURS

Instruction to All Candidates

*There are* ***SIX*** *questions.*

*Answer Questions* ***Q1*** *and* ***Q2*** *and* ***any other Two.***

**Instruction to candidates**

***There are SIX questions. Answer questions Q1 and Q2 and any other two.***

**01.** **( 40 marks)**

**Figure 1 below is a Decision Tree showing Knowledge about animals.**



**Is it very big?**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | YES | | NO |  |  |
|  | |  | **Does it squeak?** |  |  |
| **Does it have a long Neck?** | |  |  |  |
|  |  |  |  |  |  |
| **YES** | **NO** | | **YES/** | **\NO** |  |
|  |  |  |  |
|  | **Does it have a trunk?** | | **Guess : Mouse** | **Guess: Squirrel** |  |
|  |  |  |  |

**Guess : Giraffe**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **YES** | | **N O** | |  |
| **Guess: Elephant** |  |  | |  |  |
|  | **Does it like to be in water?** | |  |  |
|  |  |  |  |  |  |
|  |  | **YES** | **NO** | |  |
|  | **Guess: Hipp** | | **Guess: Rhino** | |  |



|  |  |  |
| --- | --- | --- |
| **a. From Figure 1, draw a Decision Table for Knowledge about animals.** | [5] | |
| b. Suggest a **Problem Domain name** for Figure 1. | [ | 1] |
| c. Suggest a **Knowledge Domain name for** Figure **1.** | [ | 1] |
| **d. Define a goal for the knowledge-base.** | [ | **1 ]** |

|  |  |
| --- | --- |
| **e. Define the facts and values for the knowledge-base.** | **[ 111** |
| **f. Discuss any three formalisms that could be used to represent the knowledge about** | |
| **animals.** | **[ 151** |
| Select any **one of the formalisms and write out the methods that will guess an animal** | |
| **in** the knowledge-base. | [ 6 ] |

**Q2.** **( 20 marks )**

1. State **BAYES' Theorem.** What role does the theorem play in Expert systems? [ 10]
2. Explain the following terms: -

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **i .** | F u z y | | T | h e o r y | [ | **5** | **]** |  |
|  |  |
| i i | . | C y b | e | r n e t i c s | [ | 5 | ] |  |

**Q3.** **( 20 marks )**

1. **Discuss** the proposition of Allen Newel et al that **'INTELLIGENCE** 'is **a concept** and

|  |  |
| --- | --- |
| difficult to define. | [10] |

1. **Explain** the importance of **knowledge-based intelligence** in modeling Expert Systems.

[5]

c . D i s c u s s t h e i s s u e s o f K n o w l e d g e A c q u i s i t i o n B o t t l e - n e c k . [ 5 ]

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Q4.** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **( 20 marks)** |  |
| **a .** |  | **D e f i n e** A r t i f i c i a l | | | | | | | I n t e l l i g e n c e | | | | ( A l ) . | | |  |
| [ | 3 ] |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **b . Describe** th e m aj or ch a ra ct e r is t ic s | | | | | | | | | an d fu nc t io ns | | | o f A l sy s te m s . | | | [ 8 ] |  |
| **c . Describe** the following models. Give examples to illustrate how each of the models is | | | | | | | | | | | | | | | |  |
| applied in Expert Systems. | | | | | |  |  |  |  |  |  |  |  |  |  |  |
| i | . |  | F | u | n | c | t | i | o | n | a | l | [ | 3 | ] |  |
|  |  |  |
| i | i | . | S | t | r | u | c | t | u | r | a | l | [ | 3 | ] |  |
|  |  |
| i | i | i | . |  | C l | a | s | s | i f | i c | a | t o | r y |  | [ 3 ] |  |

**Q5.** **( 20 marks)**

1. **Draw** a diagram to illustrate the **key components/elements** of knowledge Systems. [10]

**b. D i s c u s s** a n y **t h r e e m a j o r l i m i t a t i o n s** o f E x p e r t S y s t e m s . [ 6 ] **c. Contrast C-language** compiler with any **Expert System** compiler. [4]

**Q6.** **( 20** marks)

1. **Illustrate** with appropriate examples how **'chains'** are used as inference strategies in

|  |  |
| --- | --- |
| Expert Systems? | [8] |

1. Apart from **'chains'** list any **six other inference strategies** used in Expert Systems. [3]
2. **List and explain** the different **levels of abstraction** for describing and synthesizingintelligent systems.