

PAN AFRICA CHRISTIAN UNIVERSITY

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

END OF SEMESTER EXAMINATION

DEPARTMENT: COMPUTING AND INFORMATION TECHNOLOGY

COURSE CODE: BCIT310

COURSE TITLE: KNOWLEDGE BASED SYSTEMS

CAMPUS: ROYSAMBU

EXAM DATE: XXXXX XXXXX/JULY,2022

TIME: XXXXX

INSTRUCTIONS

- This exam script has **TWO (2)** sections.
- Read all questions carefully before attempting.
- Answer All questions in Section **A** and any other Three questions in Section **B**.
- Write only your **student number** on the answer booklet provided.

SECTION A

(Answer ALL questions in this section)

Question 1:

a) State the type of knowledge used by the following system: **[2 Marks]**

- i. Neural networks system
- ii. Rule-based system

b) "Knowledge acquisition is often referred to as the ES 'bottleneck'." Explain the meaning of this statement. **[3 Marks]**

c) Consider the following production rule:

IF green THEN walk

State the:

[2 Marks]

- i. antecedent of this rule
- ii. consequent of this rule

d) Knowledge Based Systems (KBSs) are developed to deal with particular application

domains in which alternatives techniques are unable to produce reliable and manageable solutions.

i). Identify and discuss five aspects of human intelligence that could be used to characterise intelligent knowledge based systems.

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aspects of human
intelligence that could be
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knowledge based systems.

d) Given the following predicate logic statements: "All animals have hooves." Write a
prolog statement to represent a precise representation. **[3 Marks]**

SECTION B

(Answer any THREE (3) questions in this section)

Question 2:

a) Represent the following sentences in predicate logic form.

i. Everyone loves Mary [2

Marks]

ii. Everyone loves someone [2

Marks]

iii. Someone walks and someone talks [2

Marks]

b) Prove that $(A \wedge B) = (A \leftrightarrow B)$ using a truth table. [4 Marks]

Question 3:

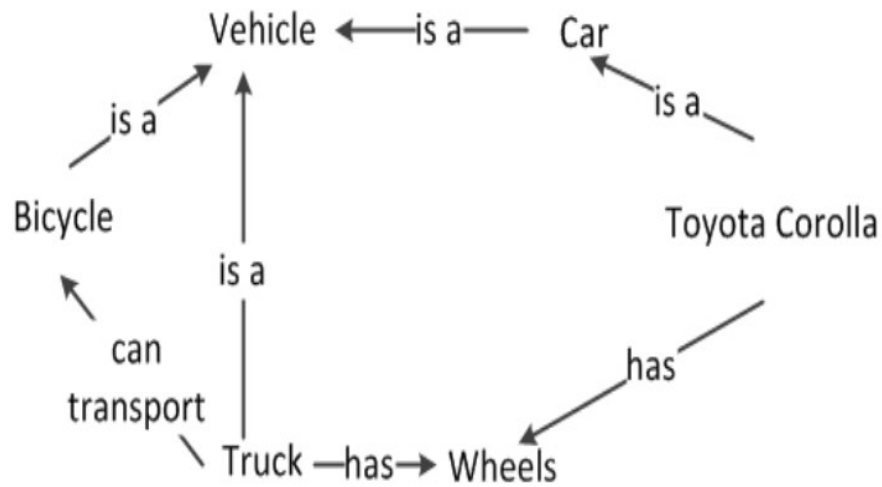
a) Development of any medical diagnosis expert system requires careful management in order to ensure that a quality product is produced. Produce a project management framework that is suitable for the construction of an interactive rule based advisory system by addressing the following tasks; capture the knowledge of medical experts in infectious blood diseases; capture the expertise of clinicians on blood diseases to provide accurate and quick diagnosis of the present disease and the proper therapeutic recommendation; and diagnose infectious blood diseases.

Required :

Identify at least four main stakeholders involved in the project, and explain their respective responsibilities in the construction of the above mentioned expert system.

[4 Marks]

b) Study the semantic network diagram below.

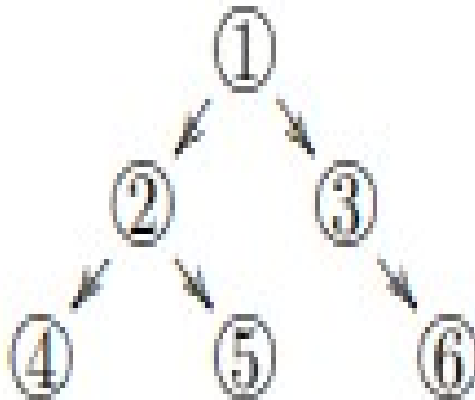


Write the sentences that will produce the above semantic diagram.

[6 Marks]

Question 4:

Consider the following graph:



Starting at root node 1, give the order in which the nodes will be visited by the :

i. Breadth-first algorithm

[5

Marks]

ii. Depth-first algorithm

[5

Marks]

Question 5:

After graduating with Bachelor's degree in Information Technology you got a contract to develop an expert system for one of the leading Agro-Vet in your area. The Agro-Vet shop not only sells farm feeds and medicines but it also provides expertise training on rearing of cows. For you to deliver in this project you are required to gather knowledge from one of the experts.

- i. Using the above description, explain the steps you will take to acquire the required knowledge. **[8 Marks]**
- ii. Apart from getting knowledge from human experts, explain other TWO sources of knowledge. **[2 Marks]**

Question 6:

The following is the rule set of a simple weather forecast expert system:

R1: IF cyclone THEN clouds

R2: IF anticyclone THEN clear sky

R3: IF pressure is low THEN cyclone

R4: IF pressure is high THEN anticyclone

R5: IF arrow is down THEN pressure is low

R6: IF arrow is up THEN pressure is high

a) Use forward chaining to reason about the weather if the working memory contains the **fact: arrow is down**. Show your answer in a table naming the rules matching the current working memory (conflict set), which rule you apply, and how the working memory contents changes on the next cycle after a rule has fired: **[5 Marks]**

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Cycle	Working Memory	Conflict set	Rule fired
⋮	⋮	⋮	⋮

b) Use backward chaining to reason about the weather if the working memory contains the **fact: clouds**. Show your answer in a similar table. **[5 Marks]**

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