(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

SPECIAL/SUPLIMENTARY EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

COURSE CODE : **CSC 464E**

COURSE TITLE : **EXPERT SYSTEMS**

DATE: 16/11/22   TIME: 11.00 A.M – 01.00 P.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE [COMPULSORY] [30 MARKS]

1. a) What do you understand by the following terms:

   i. Semantics

                     [2 marks]

   ii. Pragmatic analysis

                     [2 marks]

   iii. Discourse analysis

                     [2 marks]

   iv. Morphological analysis

                     [2 marks]

b) Disambiguate the sentence: *"He saw the man on the hill with a telescope"* [3 marks]

c) Outline three syntax parsing techniques. [3 marks]

d) Discuss the two pattern recognition schools of thought. [6 marks]

e) Explain classification and give any two typical application of classification. [4 marks]

f) Explain three areas in Kibabii University where an Expert System can be applied. [6 marks]

QUESTION TWO [20 MARKS]

a) Define the following terminologies:

   i. Class

                     [2 marks]

   ii. Reject class

                     [2 marks]

   iii. Classifier

                     [2 marks]

b) Describe briefly the nearest neighbor classification. [4 marks]

c) Decision Trees can be used as Classifiers. Explain the characteristics of the Decision Tree. [6 marks]

e) Discuss briefly artificial neural networks (ANN). [4 marks]

QUESTION THREE [20 MARKS]

a) With the help of a diagram, describe in details the global Expert System architecture. [8 marks]

b) i) outline the steps involved in the development of an Expert Systems. [6marks]

  ii) Several methods are used in expert systems to deal with uncertainty arising from (a) uncertainty of the data, (b) less than certain associations between data and conclusions, and (c) combinations of these. Outline any **FOUR** methods used to address uncertainty issues. [6marks]

QUESTION FOUR [20 MARKS]

a) Explain the main advantages in keeping the knowledge base separate from the control module in knowledge-based systems [3 marks]

c) Differentiate between Domain knowledge and Case knowledge [4 marks]

d) i. With the help of diagrams, explain the difference between forward chaining and backward chaining. [4 marks]

ii. Under what conditions would each be best to use for a given set of problems. [3 marks]

e) Distinguish between "Rule based systems and Non-production systems". [6 marks]

QUESTION FIVE [20 MARKS]

a) State and explain briefly any three applications of NLG. [6 marks]

b) Study the natural language processor below:

```
{:SENTENCE
{:NP
 {:DETP {#$Determiner [the]}}
 {:N-BAR {#$SimpleNoun [man]}}}
{:VP
 {#$Verb [saw]}
   {:NP {:DETP {#$Determiner [the]}}
     {:N-BAR {#$SimpleNoun [light]}}
   {:PP {#$Preposition [with]}
     {:NP {:DETP {#$Determiner [the]}}
       {:N-BAR {#$SimpleNoun [telescope]}}}}}}}
```

i. Which language parse is being used in the NLP above? [2 marks]

ii. Identify the ambiguities in the sentence being processed above. [2 marks]

c) You are faced with the problem of sorting incoming fish on a conveyor belt according to species. The fish are to be sorted as either Salmon or Sea bass. Required:

i. Outline kinds of information that may be used to distinguish one species of fish to the other? [6 marks]

ii. What are some of the factors that may cause problems during sensing? [2 marks]

iii. What are the steps in the sorting process? [2 marks]