MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR
SECOND YEAR FIRST SEMESTER

SCHOOL OF PURE APPLIED AND HEALTH SCIENCES
BSC COMPUTER SCIENCES

COURSE CODE: COM 2113-1:

COURSE TITLE: ARTIFICIAL INTELLIGENCE

DATE: 7th DEC, 2023 **TIME: 11:00AM-1:00PM**

INSTRUCTIONS TO CANDIDATES

Answer Question ONE and any other TWO question

QUESTION 1 – OUT OF 20 MARKS (COMPULSORY)

QUESTION 1 (20 marks)

a) List FOUR rules of proposition logic **(4 Marks)**

b) List and explain FOUR application areas of AI **(4 Marks)**

c) Write each of the following sentences using a quantifier and then the equivalent quantifier (Use the De Morgan's rules for the conversion). **(8 marks)**

i. Every election has a winner
ii. Only those trees that are tall have long roots
iii. Eating dinner does not impact one's height.
iv. All birds can fly except for penguins and ostriches or unless they have a broken wing.

d) "My dog, named Tommy barks only when there is a stranger at the gate. Given that there no stranger at the gate. Will Tommy bark? "Use the following concepts to solve this problem**:** **(4 Marks)**

i. Modus ponens
ii. Resolution

QUESTION 2 (15 Marks)

a) A mother is a female parent while a father is a male parent of someone. A grandmother is a mother of the female or male parent of someone while a grandfather is the male parent of someone's mother or father. John is a male. He is parent of Tony, a male and Jerry a female. Jackie's mother is Jerry and she calls Esther grandmother. Write a prolog program that contains the above facts and rules and answers the following questions (show the queries) **(10 Marks)**

i. Who is Jackie's grandmother?
ii. List all grandchildren of Esther
iii. Lists all male parents
iv. All parents
v. Lists all mothers

b) Differentiate between the following terms as used in AI **(5 marks)**

i. First order predicate

ii. second-order predicates

iii. rules

QUESTION 3 (15 Marks)

a) Explain three approaches to knowledge representation in AI **(9 Marks)**

b) Represent the following statements in the form of nodes and arcs. **(6 marks)**

Statements:

i. Jerry is a cat.

ii. Jerry is a mammal

iii. Jerry is owned by Otieno.

iv. Jerry is brown colored.

v. All Mammals are animal

QUESTION 4 (15 marks)

a) Consider a section of a Prolog program below. c(1,4). c(2,1). c(2,3). c(2,6). c(3,5). c(5,4). r(X,X). r(X,Y) :- c(Z,Y), r(X,Z).

What would Prolog return if given the following queries? (Report all the answers returned, in the order Prolog would return them. Show the corresponding value of Z). **(5 marks)**

i) ?- r(2,4).

ii) ?- r(W,4).

iii) ?- r(2,5).

b) List five different kinds of knowledge that can be represented in AI **(5 Marks)**

c) Explain the circle of knowledge representation **(5 Marks)**

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