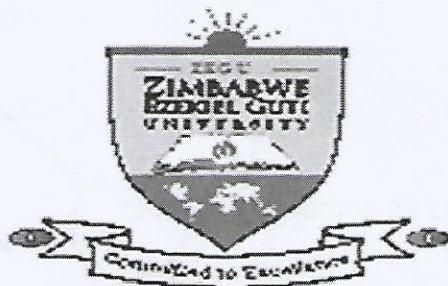


ZIMBABWE EZEKIEL GUTI UNIVERSITY



**FACULTY OF SCIENCE, TECHNOLOGY, AGRICULTURE AND
FOOD SYSTEMS DEVELOPMENT**

Department of Information Systems

Module Code: BIS 412

Module Name: ARTIFICIAL INTELLIGENCE

Level: 4.1

Exam Duration: 3 hours

Year: 2024

11 APR 2024

Instructions

- (i) Mark allocation for each question is shown in square brackets.
- (ii) Number your answers accordingly.
- (iii) The total marks for the examination is 100.
- (iv) Answer any four questions

QUESTION ONE

- a) Represent the above facts as semantic network

[12]

'The aorta is a particular kind of artery that has a diameter of 2.5 cm. An artery is a kind of blood vessel. An artery always has a muscular wall, and generally has a diameter of 0.4 cm. A vein is a kind of blood vessel, but has a fibrous wall. Blood vessels all have tubular form and contain blood'.

- b) Geometrical figures such as polygons, rectangles, etc. have an important property. Most of them are special cases of a more general figure, as explained in the following paragraph.

A quadrilateral is a polygon with 4 sides. A parallelogram is a quadrilateral in which opposite sides are parallel. If you specialise this further by restricting the four angles to be right angles you have a rectangle. A rectangle becomes a square if you make all sides equal.

Represent this hierarchy of mathematical figures using a frame structure

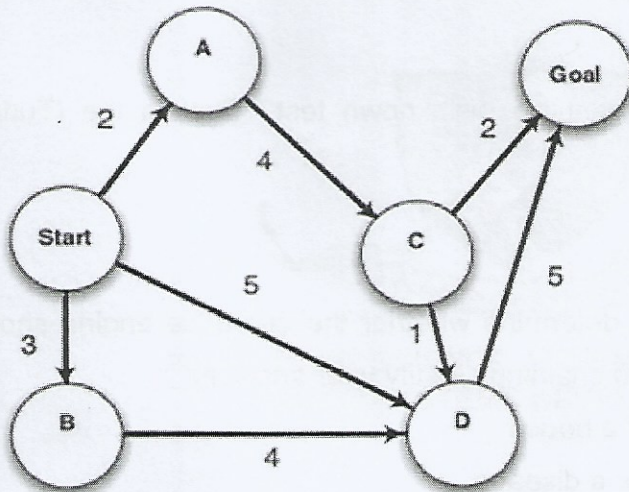
[13]

QUESTION TWO

- a) State any three goals of search methods and provide any three real-world problems where search can be applied to give solutions.

[10]

- b) Consider the state space graph below. For each of the following search strategies, work out the path returned by the search on the graph shown below. Draw the search tree and return the path. In all cases assume ties resolve in such a way that states with earlier alphabetic order are expanded first. Note: you may represent the Goal as "G"



Node	$h(n)$
Start	10
A	6
B	10
C	2
D	4
Goal	0

- i. Depth First search
- ii. Breath first search
- iii. Uniform cost search
- iv. Greedy search
- v. A-star search

[15]

QUESTION THREE

Knowledge elicitation consists of a set of techniques for collecting the knowledge of domain experts. There are many different techniques which can be used for knowledge elicitation.

a) Use a knowledge representation scheme to present the knowledge base for your chosen domain. Discuss how your knowledge base could be used to solve problems within the domain, giving examples of the impact that the system might have. [15]

b) Using real world examples, describe the application of certainty factors in AI technologies.

[10]

QUESTION FOUR

a) Define the major tasks performed by knowledge engineers. elaborate the major advantages of acquiring knowledge through a knowledge engineer? Knowledge engineers are compared to system analysts, why?

[13]

- b) In what context did Turing suggest his well-known test? Explain the (Turing) test. [12]

QUESTION FIVE

- a) For each of the following tasks, determine whether the inference engine should use forward chaining or backward chaining. Justify your answers.
- i. designing the layout of a house
 - ii. diagnosing a patient for a disease
 - iii. determining the classification of a certain chemical substance
 - iv. troubleshooting a piece of electronic equipment [8]
- b) With the aid of diagrams, compare and contrast the structure of an Expert system on the 'Human Expert Problem' and 'Expert System Problem' solving. [12]
- c) Briefly describe the conflict resolution strategies; specificity, recency and refractoriness [5]

QUESTION SIX

- a) For each of the following tasks, decide whether the expert systems approach is applicable. Justify your answers.
- i. Solving a set of simultaneous equations
 - ii. Computing the income tax for a person, given the required information
 - iii. Diagnosing a fault in a television set
 - iv. Predicting the lifespan of a person
 - v. Measuring the IQ (intelligence quotient) of a person [15]
- b) Explain the difference between forward chaining and backward chaining with the aid of examples. [8]
- c) Now you are in the middle of a desert, digging for a hidden treasure. Which algorithm would you choose? Why? [2]