



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022

- COURSE NAME : ARTIFICIAL INTELLIGENCE
- COURSE CODE : BIT 20903
- PROGRAMME CODE : BIT
- EXAMINATION DATE : JULY 2022
- DURATION : 3 HOURS
- INSTRUCTION :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS AN **ONLINE** ASSESSMENT AND CONDUCTED VIA **CLOSED BOOK**.
 3. STUDENTS ARE **PROHIBITED** TO CONSULT THEIR OWN MATERIAL OR ANY EXTERNAL RESOURCES DURING THE EXAMINATION CONDUCTED VIA CLOSED BOOK.

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

- Q1** (a) Explain machine learning in relation to Artificial Intelligence. (4 marks)
- (b) Convert each of the statements into first order logic.
- (i) Hanan likes all kind of sports. (2 marks)
- (ii) Soccer and badminton are sports. (2 marks)
- (iii) Anything anyone plays and not injured is a sport. (3 marks)
- (c) Unify each of the following.
- (i) $friend(Jimmy, x), friend(Jimmy, Lenny)$ (2 marks)
- (ii) $friend(Jimmy, x), friend(x, Elize)$ (2 marks)
- (iii) $friend(Jimmy, x), friend(y, mother(y))$ (2 marks)

- Q2** (a) Describe the process required to develop an expert system. (5 marks)
- (b) Answer **Q2(b)(i)** and **Q2(b)(ii)** based on **Figure Q2(b)**.

Rule 1: IF the applicant answers questions in a straightforward manner, THEN she is easy to converse with.

Rule 2: IF the applicant seems honest, THEN the applicant answers questions in a straightforward manner

Rule 3: IF the applicant has items on her resume that are found to be untrue, THEN she does not seem honest, ELSE the applicant seems honest.

Rule 4: IF the applicant is able to arrange an appointment with the executive assistant, THEN the applicant seems honest.

Rule 5: IF the applicant is able to strike up a conversation with the executive assistant, AND she is easy to converse with, THEN she is likeable.

Rule 6: IF she is likeable, THEN has adequate interpersonal skills.

Rule 7: IF has adequate interpersonal skills, THEN will offer the job.

Assume that the applicant does not have any items on her resume that are found to be untrue, and she is able to arrange an appointment with the executive assistant.

Figure Q2(b)

- (i) Perform backward chaining analysis. (20 marks)
- (ii) Based on the answer in **Q2(b)(i)**, determine if the applicant will be offered the job. (5 marks)

Q3 (a) Explain **TWO (2)** learning methods of artificial neural networks. For each learning method, discuss an example of appropriate applications.

(6 marks)

(b) Construct a multilayer perceptron (MLP) model for diabetes classification based on **Figure Q3(b)**.

Input: age, physical activity, pregnancy, family history, body mass index, cholesterol, diastolic blood pressure
 Class: Normal, Abnormal

Figure Q3(b)

(16 marks)

Q4 Answer **Q4(a)** to **Q4(c)** based on **Table 1**.

Table 1: Air Quality Index

Variable	Categories	Range
PM _{2.5} ($\mu\text{g}/\text{m}^3$)	Low	0.0 to 15.4
	Medium	15.5 to 40.4
	High	40.5 to 65.4
SO ₂ (ppm)	Low	0.000 to 0.034
	Medium	0.035 to 0.144
	High	0.145 to 0.224
AQI	Good	0 to 50
	Moderate	51 to 100
	Unhealthy	101 to 150

(a) Identify the linguistic variable(s) and the linguistic value(s). Write the answer in fuzzy set representation.

(6 marks)

(b) Draw a membership function graph for each input and output.

(18 marks)

(c) Suggest a fuzzy system architecture.

(7 marks)

- END OF QUESTIONS -

