

**CONFIDENTIAL**



**UNIVERSITI TUN HUSSEIN ONN MALAYSIA**

**FINAL EXAMINATION  
SEMESTER II  
SESSION 2022/2023**

COURSE NAME : ARTIFICIAL INTELLIGENCE

COURSE CODE : BIT 20903

PROGRAMMECODE : BIT

EXAMINATION DATE : JULY 2023

DURATION : 3 HOURS

INSTRUCTION

1. ANSWER ALL QUESTIONS

2. THIS FINAL EXAMINATION IS  
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

**TERBUKA**

**Q1** Based on **Figure Q1**, answer **Q1(a) – Q1(d)**.

Suppose you are working as a project manager in a software development company. The company is planning to develop a new software system that will require the involvement of multiple teams and stakeholders. As the project manager, you need to ensure that the project is completed on time, within budget, and meets the quality standards.

**Figure Q1**

- (a) Explain how fuzzy expert systems can help project managers in decision-making. (5 marks)
- (b) Identify **THREE (3)** potential problems that could arise during the software development project. (3 marks)
- (c) Based on **Q1(b)**, construct a set of fuzzy rules for each problem that could be used in a fuzzy expert system. (7 marks)
- (d) Discuss the limitations of using fuzzy expert systems in project management. What are some potential solutions to address these limitations? (5 marks)

**Q2** Answer **Q2 (a) – Q2(d)**, based on **Figure Q2**.

You are working on a project to develop an autonomous vehicle that needs to plan a path from a starting point to a destination point in a city. The city is represented as a graph, where each vertex represents a location in the city and each edge represents a road connection between two locations. The vehicle needs to consider various factors when planning its path, such as traffic conditions, road closures, scenic routes, and avoiding high crime areas.

**Figure Q2**

- (a) Explain in what situations the use of BFS (Breadth -First Search) and DFS (Depth-First Search) algorithms in path planning for autonomous vehicles. (5 marks)

- (b) Write pseudocode describing how you would combine BFS and DFS algorithms to plan a path for the autonomous vehicle that balances efficiency and other important factors. Assume that the graph is represented as an adjacency list. (10 marks)
- (c) Discuss the limitations of using graph traversal algorithms for path planning in complex city environments. (5 marks)

**Q3** Machine learning techniques are mainly: supervised learning, unsupervised learning, and reinforcement learning.

- (a) Suggest a creative and innovative problem that can be solved using those techniques. Explain how you would approach the problem, what data you would need, and what tools or algorithms you would use. As you discuss each technique, remember to highlight its strengths and limitations, and provide real-world examples to support your arguments. (10 marks)
- (b) A machine learning model is a complex and challenging task that requires careful consideration of multiple factors, demonstrate your understanding of the key components that make up a successful machine learning model: problem formulation, data collection and preparation, and accuracy evaluation. (10 marks)

**Q4** Natural Language Processing (NLP) has various applications in real-world scenarios, such as chatbots, text summarization, and sentiment analysis.

- (a) Discuss **TWO (2)** of these applications in detail, and explain how NLP is used to solve problems in these areas. Additionally, describe the challenges that may arise when developing NLP applications for these scenarios and how they can be addressed. (10 marks)
- (b) Explain the different techniques and models used in NLP for each of the two applications discussed in **Q4(a)**, and compare their advantages and disadvantages. (10 marks)

- Q5** (a) To optimize the performance of neural networks, there are various techniques that can be applied. Discuss and explain at least **FOUR (4)** different techniques that can be used to enhance the performance of neural networks, and provide examples of how they can be applied to real-world scenarios. (5 marks)
- (b) Explain the supervised training algorithm used for artificial neural networks in detail, outlining the various steps involved and the significance of each step? Discuss how the network learns to recognize patterns in input data and adjust its weights and biases to produce accurate outputs. (10 marks)
- (c) Imagine that you have been hired by a credit card company to design a system for assessing credit worthiness of its customers. You propose to use a feed-forward neural network with a supervised learning algorithm. However, before the system can be deployed, what are the critical components that the bank needs to have in place? Furthermore, examine the potential issues that may arise due to these prerequisites. (5 marks)

**-END OF QUESTIONS-**