



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2023/2024**

- COURSE NAME : MACHINE LEARNING
- COURSE CODE : BIT 34303
- PROGRAMME CODE : BIT / BIP / BIS / BIW / BIM
- EXAMINATION DATE : JULY 2024
- DURATION : 3 HOURS
- INSTRUCTIONS :
1. ANSWER ALL QUESTIONS
 2. THIS FINAL EXAMINATION IS CONDUCTED VIA
 - Open book
 - 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 **THREE (3)** PAGES

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Q1 The evaluation metric in machine learning quantifies a model's performance by measuring how well it predicts outcomes against actual values, providing a numerical measure of its effectiveness.

(a) List **TWO (2)** evaluation metrics for classification tasks other than accuracy and precision.

(2 marks)

(b) Define accuracy as evaluation metrics.

(2 marks)

(c) Explain when accuracy metric is important in medical diagnosis.

(2 marks)

Q2 Consider a binary classification model predicting whether emails are spam (positive class) or not spam (negative class). The confusion matrix for this model based on a test dataset of 200 emails is given in **Table Q2.1**. Answer **Q2(a)** to **Q2(g)** based on **Table Q2.1**

Table Q2.1

	Predicted Not Spam (Predicted Negative)	Predicted Spam (Predicted Positive)
Actual Not Spam (True Negative)	140	10
Actual Spam (True Positive)	20	30

(a) Calculate the accuracy score.

(3 marks)

(b) Calculate the precision score.

(3 marks)

(c) Explain the meaning of accuracy and precision measures in the context of email spam classification.

(4 marks)

(d) Discuss the implications of the model's performance based on accuracy and precision metrics.

(4 marks)

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Q3 A Convolutional Neural Network (CNN) is a type of deep neural network that is particularly well-suited for analysing visual data.

- (a) Discuss the challenges related to model size, computational complexity, memory requirements, and energy efficiency when deploying CNNs in real-world applications, particularly in resource-constrained environments such as mobile devices or edge devices.

(8 marks)

- (b) Give **THREE (3)** advantages and **THREE (3)** disadvantages. Provide real-world examples to support your arguments.

(16 marks)

Q4 Unsupervised learning plays a pivotal role in the realm of machine learning by allowing algorithms to discover patterns and structures within data without explicit guidance or labelled examples.

- (a) Provide **TWO (2)** examples of real-world applications where unsupervised learning techniques are commonly used.

(4 marks)

- (b) Discuss **THREE (3)** challenges associated with evaluating the performance of unsupervised learning algorithms compared to supervised learning algorithms.

(6 marks)

- (c) Give **THREE (3)** strengths and **THREE (3)** limitations of the K-Means clustering algorithm.

(12 marks)

- (d) Please provide an example of a scenario where K-Means clustering situations may not perform well.

(4 marks)

Q5 A recommendation system refers to the process of suggesting or offering relevant items or content to users based on their preferences, previous likes and dislikes, interests, or past behaviour.

- (a) Discuss the benefits of recommendation systems for businesses in the e-commerce sector.

(6 marks)

- (b) How hybrid recommender systems improve recommendation accuracy compared to single-method systems.

(4 marks)

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- END OF QUESTIONS -