



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

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

- COURSE NAME : INTELLIGENT TRANSPORTATION SYSTEM
- COURSE CODE : BNT 32103
- PROGRAMME CODE : BNT
- 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 **FOUR (4)** PAGES

- Q1** Intelligent Transport Systems (ITS) encompass a range of advanced technologies designed to play a crucial role in modernizing transportation networks and fostering smarter, more efficient mobility solutions for both urban and rural areas.
- (a) List out **FIVE (5)** array of technologies integrated within ITS across diverse transportation networks.
(5 marks)
- (b) Elucidate **FOUR (4)** distinct components inherent in the Transit Management System (TMS) that propel the progression of public transportation systems.
(8 marks)
- (c) Illustrate **ONE (1)** Internet of Things (IoT) device seamlessly integrated within the railway network system.
(4 marks)
- (d) Examine **TWO (2)** merits and demerits associated with the integration of an open toll payment system within the context of Malaysia.
(8 marks)

- Q2** MRT arrivals at the Hospital Kuala Lumpur station is assumed to be Poisson distributed, with an average arrival rate of 1 vehicle every 2.5 minutes. Using probabilistic distribution of $P(n) = \frac{(\lambda t)^n e^{-\lambda t}}{n!}$, determine the probability if:

- (a) Exactly 3 vehicles arrive in a 9-minutes interval.
(4 marks)
- (b) Less than 4 vehicles arrive in a 9-minutes interval.
(3 marks)
- (c) More than 5 vehicles arrive in 9-minutes interval.
(3 marks)

During peak hour, only 4 operating automated gates were available at one of the MRT station before reaching the train platform. On average, the automatic gate takes 2 seconds to process the ticket, permitting entry. The average arrival rate is 75 people/minute. Using the M/M/N queuing system, evaluate:

- (d) The average length of queue.
(7 marks)
- (e) The average waiting time in queue.
(4 marks)
- (f) The average time spent in system.
(4 marks)

Q3 RapidMiner Studio stands out as a robust data mining solution, offering a comprehensive suite of features ranging from data mining and modeling to deployment and operational management. Positioned as a data science platform, it caters to a diverse range of analytics users, supporting them throughout the entire Artificial Intelligence (AI) lifecycle.

- (a) Based on your experience in developing a model, explain the following operators/parameters found in RapidMiner Studio,
 - (i) Split validation (2 marks)
 - (ii) Set Role (2 marks)
 - (iii) Root Mean Squared Error (2 marks)
 - (iv) Support Vector Machine (2 marks)
 - (v) Apply Model (2 marks)

(b) In **Figure Q3.1**, the distance parameter has been automatically designated as REAL, while the time taken parameter defaults to INTEGER within the RapidMiner machine learning environment.

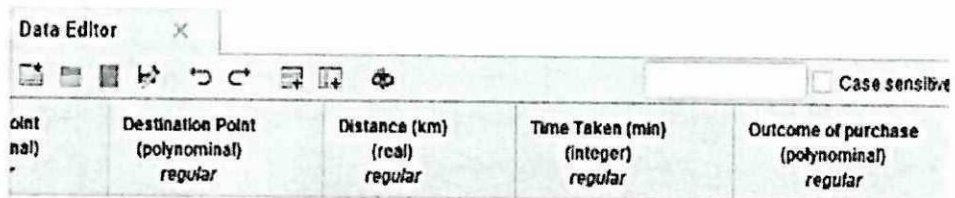


Figure Q3.1: Data Editor in RapidMiner Software

- (i) In your opinion, elaborate on the rationale behind the machine learning system's decision to assign these two parameters separately. (5 marks)
- (ii) Outline a schematic methodology for devising a straightforward predictive model to forecast the outcomes of ticketing system purchases, drawing from your comprehension of RapidMiner machine learning capabilities. (10 marks)

- Q4** An ECRL coach is moving along a straight horizontal elevated track. The vehicle travels 2024 metres in 115 seconds between two sets of signalling. The coach begins at rest and accelerates continuously for 32 seconds, reaching a speed of 18 m/s. The coach maintains this speed for t seconds. The coach then travels with steady deceleration, coming to a stop at the second set of signalling.
- (a) Sketch a speed-time graph for the motion of the coach between the two sets of signalling.
(5 marks)
- (b) Determine the value of t .
(5 marks)
- (c) Another ECRL coach (second coach) departs the first set of signalling 15 seconds after the preceding coach. This coach accelerates from rest at a constant rate of $a \text{ m/s}^2$ and passes the previous coach at point A, which is 1012 metres from the first set of signalling. When the second coach passes the first coach, the first coach is travelling at a speed of 18 m/s.
- (i) Determine the time taken for the second coach to move from the first set of signalling to the point A.
(10 marks)
- (ii) Find the value of a .
(5 marks)

- END OF QUESTIONS -