UTHM
Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2022/2023

COURSE NAME	:	INTELLIGENT TRANSPORTATION SYSTEM
COURSE CODE	:	BNT 32103
PROGRAMME CODE	:	BNT
EXAMINATION DATE	:	JULY/AUGUST 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

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Q1 (a)   List out the benefits of Intelligent Transportation System (ITS) found in general transportation modes.

(5 marks)

(b)   Explain briefly the known component available in the Transit Management System (TMS) that advances the public transportation system.

(8 marks)

(c)   Demonstrate how Internet of Things (IoT) is being integrated into ITS.

(4 marks)

(d)   Illustrate the involvement of IoT in railway network system.

(8 marks)

Q2 (a)   A LRT coach is moving along a straight horizontal elevated track. The vehicle travels 2255 metres in 135 seconds between two sets of signalling. The coach begins at rest and accelerates continuously for 40 seconds, reaching a speed of 22 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.

(i)   Sketch a speed-time graph for the motion of the coach between the two sets of signalling.

(5 marks)

(ii)   Determine the value of t.

(5 marks)

(b)   Another LRT 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 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 22 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 using Time – Distance method.

(5 marks)

Q3   RapidMiner Studio is a powerful data mining tool that enables everything from data mining to model deployment, and model operations. It's data science platform is intended to support many analytics users across a broad AI (Artificial Intelligence) lifecycle.

(a)   Based on your experience in developing a model, explain the following operators/parameters found in RapidMiner Studio,

(i)   Cross Validation

(2 marks)

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(ii) Set Role.

(2 marks)

(iii) Apply model

(2 marks)

(iv) Regression Performance

(2 marks)

(v) Write Excel

(2 marks)

(b) In **Figure Q3(b)**, the distance has been automatically set as REAL whereas the time taken defaulted as INTEGER in RapidMiner machine learning.

(i) In your opinion, justifies in what consideration was taken by the machine learning to assigned these two parameters separately.

(5 marks)

(ii) Recommend a step-by-step approach to developing an accurate prediction model for the outcome of a ticketing system purchase based on your understanding of RapidMiner machine learning.

(10 marks)

Q4 (a) MRT arrivals at the Persiaran KLCC station (PY21) are assumed to be Poisson distributed, with an average arrival rate of 1 vehicle every 3 minutes. Using probabilistic distribution of $P(n) = \dfrac{(\lambda t)^n e^{-\lambda t}}{n!}$, determine the probability if:

(i) Exactly 3 vehicles arrive in a 9-minutes interval.

(4 marks)

(ii) Less than 3 vehicles arrive in a 9-minutes interval.

(3 marks)

(iii) More than 3 vehicles arrive in 9-minutes interval.

(3 marks)

(b) 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/N/N queuing system, evaluate:

(i) The average length of queue.

(7 marks)

(ii) The average waiting time in queue.

(4 marks)

(iii) The average time spent in system.

(4 marks)

-END OF QUESTIONS-

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SYSTEM

Data Editor   ×

                                                Case sensitive

oint nal)	Destination Point (polynominal) regular	Distance (km) (real) regular	Time Taken (min) (integer) regular	Outcome of purchase (polynominal) regular

Figure Q3(b)