Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2021/2022

COURSE NAME	:	TRANSPORTATION SYSTEM AND PLANNING
COURSE CODE	:	BNT 10502
PROGRAMME CODE	:	BNT
EXAMINATION DATE	:	JULY 2022
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 **SEVEN (7)** PAGES

Q1 The basic elements of transportation planning and travel demand forecasting are the fundamental process for the transportation planning and design. There are seven (7) basic elements of transportation planning and four (4) stages travel demand forecasting.

(a) Explain briefly **SEVEN (7)** basic elements in transportation planning process.

(5 marks)

(b) Land use concepts are the earlier steps to understand the travel demand forecasting process. Explain briefly **THREE (3)** key theories of urban land use.

(5 marks)

(c) Pagoh district is divided by four (4) – zones with the following characteristics as in **Table Q1(c)(i)**. The travel times from zone to zone are in **Table Q1(c)(ii).** An exponent of 2.2 is justified based on investigation done with other cities of the same size. The city is likely to grow by 15% overall within 15 years.

(i) Apply accessibility model to find the population located in each zone in the horizon year (relative development potential) within 15 years.

(10 marks)

(ii) Determine population allocated to each zone in 15 years.

(5 marks)

Q2 The Johor State Government is planning to develop six (6) zones centroids in the area of Pagoh. The railway networks will be connected through these zones (**Figure Q2**). The travel times (minutes) between zones are estimated as at **Figure Q2**. The trips (number of passengers) from zone to zone are presented in **Table Q2**.

(a) Sketch the minimum path from zone to other zones (zone 1 to other zones, zone 2 to other zones, etc.).

(6 marks)

(b) Apply all-or-nothing trip assignment method to find the total trips for each link.

(10 marks)

(c) Sketch the new minimum path if route 3 – 6 and 4 – 5 are closed due to routine maintenance.

(6 marks)

(d) Explain briefly your findings from Q2(c).

(3 marks)

Q3 (a) Railway noise is one of the issues in environmental impacts of railway operations and maintenance. Noise is commonly measured as a pressure in decibel (dB). Every human activities contribute to the noise level (dB).

Define briefly the following term:

(i) Noise

(2 marks)

(ii) Intensity of Sound

(2 marks)

(iii) dBA Scale

(2 marks)

(b) Train Noise investigation was conducted along the turnouts track of railway at the distance of 45 meters (sources – reception point) with the position of view angle (θ) 15° (**Figure Q3(b)(i)**). The track is used for Light Rail Transit (LRT) trains with the total length of coach 210 meters and average speed of 120 km/hr (**Figure Q3(b)(ii)**). The sound level measurement and maximum sound level, L_{max} can be seen in **Figure Q3(b)(iii)**.

(i) Determine Maximum Sound Level, L_{max} correction for the distances and speed.

(6 marks)

(ii) Employ the Sound Exposure model to find Sound Exposure Level (SEL) at 61 meters from turnouts track using correction factors from the result Q4(b).

(7 marks)

(iii) Apply the Sound Level measurement model to estimate Equivalent Sound Level (L_{eq}) at position view angle (θ') of 30° in 24 hours with 20 trains per day.

(6 marks)

Q4 The Railway Operator company has an estimation of demand function connecting patronage (Q) and price per ride (P) within certain limits as

$$Q = 2125 - 1000\,P$$

where Q is person-trips/day and P is the price (RM/ride). The company has the following options to increase the total revenue:

- **Option A**: attracting additional riders by rescheduling and rerouting the service and thus changing the demand function to

$$Q = 2150 - 1000\,P$$

- **Option B**: Encouraging more riders onto the system by reducing the fare from RM 1.30 to RM 1.00.

Based on the above information

(a) Apply the demand function to find additional revenue due to **option A**.

(9 marks)

(b) Use the reducing fare to find additional revenue due to **option B**.

(9 marks)

(c) Comment briefly on which option is better.

(7 marks)

– END OF QUESTIONS –

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Table Q1(c)(i)

Zone	Total Existing Population	Holding Capacity (acres)
1	3000	400
2	2500	380
3	9000	600
4	4500	450

Table Q1(c)(ii)

	To *j*			
From *i*	1	2	3	4
1	5	10	12	15
2	10	4	9	20
3	12	9	3	14
4	15	20	14	6

Table Q2

From zone	To zones					
	1	2	3	4	5	6
1	0	500	550	200	500	650
2	500	0	525	350	550	600
3	550	525	0	600	575	800
4	200	350	600	0	400	200
5	500	550	575	400	0	350
6	650	600	800	200	350	0

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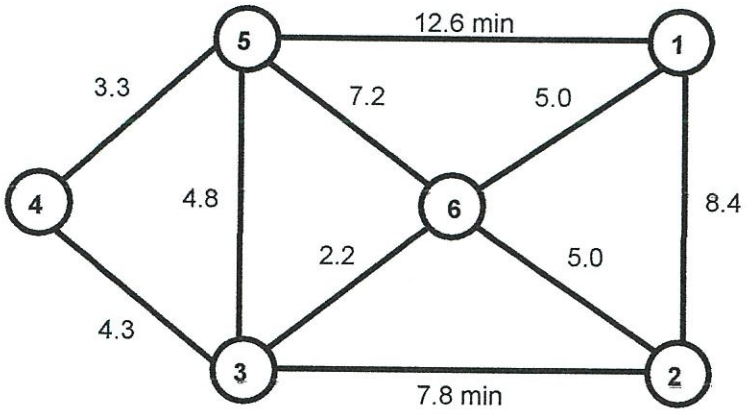

Figure Q2

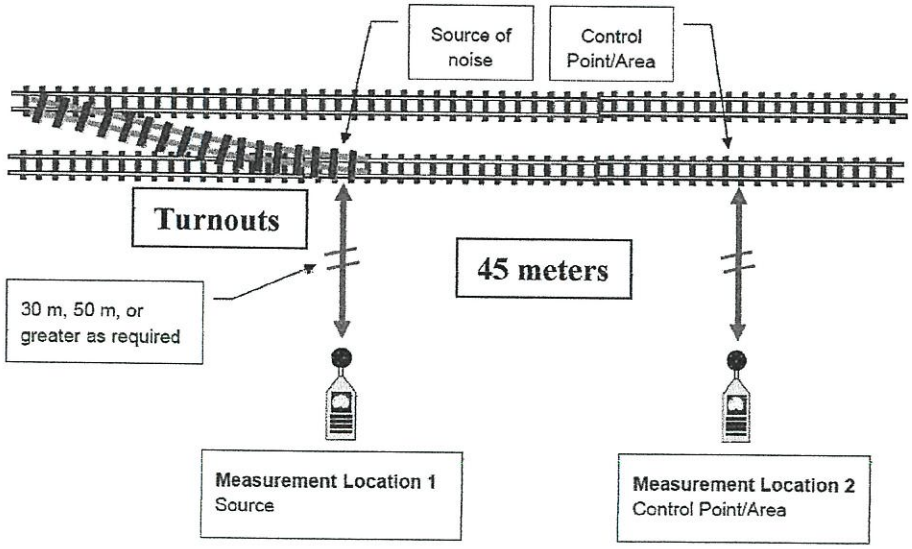

Figure Q3(b)(i)

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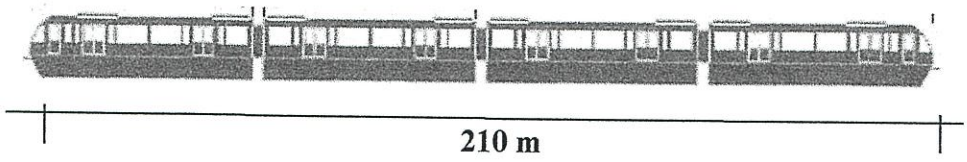

Figure Q3(b)(ii)

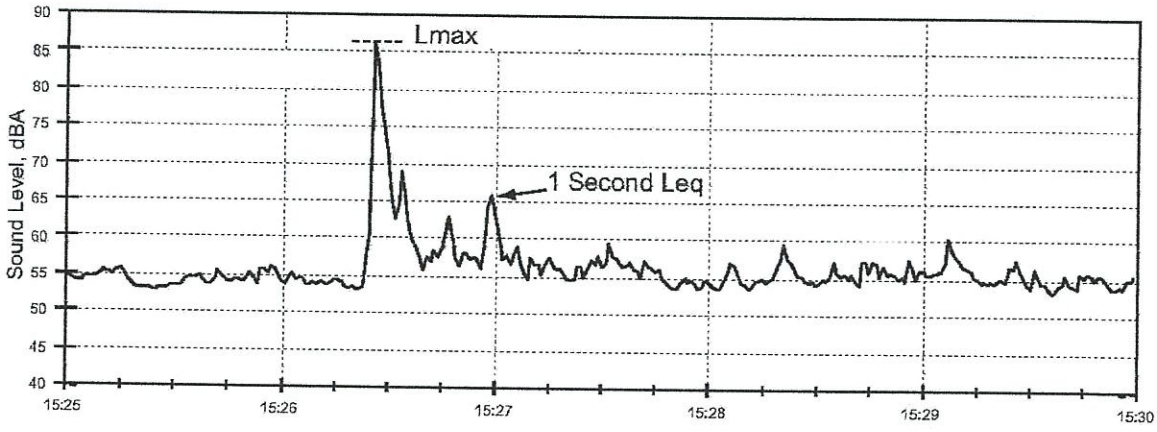

Figure Q3(b)(iii)