Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2018/2019

COURSE NAME	:	TRANSPORTATION SYSTEM AND PLANNING
COURSE CODE	:	BNT 10502
PROGRAMME CODE	:	BNT
DATE	:	JUNE/JULY 2019
DURATION	:	2 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q1 Land use study have been conducted in Batu Pahat district. The district is divided into four-zones. The zone has characteristics as in **Table Q1(a)**. The travel time (minutes) of zones is in **Table Q1(b)**. An exponent of 2.2 can be used based on work done with other cities of the same size. The city is likely to grow by 15% overall in 20 years. The study is based on accessibility, development potential and population allocated.

(a) Explain briefly the definition of accessibility index A_i , development potential D_i , population allocated, G_i

(5 marks)

(b) Determine the development potential of each zone, D_i

(5 marks)

(c) Determine the population allocated to each zone, G_i

(5 marks)

(d) Determine the percentage of change of population allocated of each zone if the exponent index become 2.5 and briefly comments your findings.

(10 marks)

Q2 The Johor local authority is planning to develop **SIX (6)** zones centroids in the area of Batu Pahat. 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) Determine the total trips for each link by using the *all-or-nothing* trip assignment method.

(10 marks)

(c) Sketch the new minimum path if route 3 – 6 is closed.

(6 marks)

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

(3 marks)

Q3 Noise measurement was conducted along the turnouts track of railway at the distance of 50 meters (sources – reception point) with the position of view angle (θ) 15° (**Figure Q3(a)**). The track is used for trains with the type of 205 meters length and average speed of 180 km/hr (**Figure Q3(b)**). The sound level measurement can be seen in **Figure Q3(c)**.

(a) Determine SEL correction for distance and speed.

(5 marks)

(b) Apply the results Q3(a) to calculate Sound Exposure Level (SEL) at 61 meters from turnouts track.

(10 marks)

(c) Determine Equivalent Sound Level (Leq) at position view angle (θ') of 30° in 24 hours with 15 trains per day.

(10 marks)

Q4 A transit train company has a 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 information above

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

(7 marks)

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

(7 marks)

(c) Briefly comment on which option is better and sketch the demand function graph of initial condition and option a.

(11 marks)

- END OF QUESTIONS –

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TABLE Q1(a)

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

TABLE Q1(b)

	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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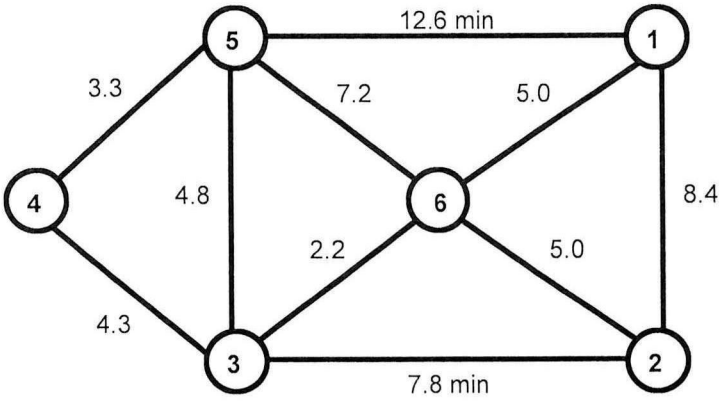

FIGURE Q2

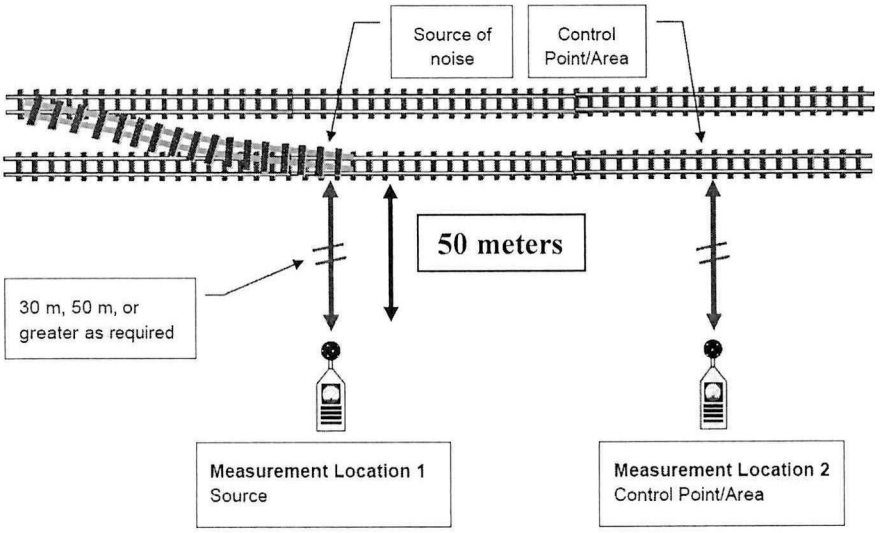

FIGURE Q3(a)

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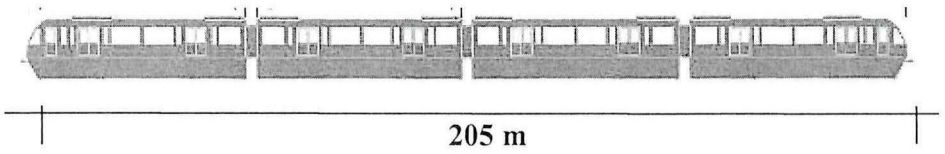

FIGURE Q3(b)

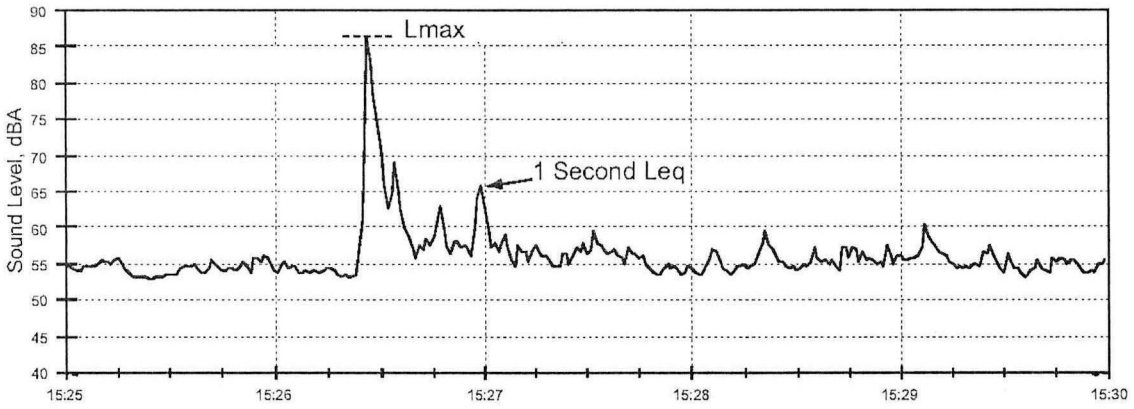

FIGURE Q3(c)

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FORMULA:

$$A_{ij} = \sum_j \left(\frac{E_j}{d_{ij}^{\ b}}\right) \qquad D_i = A_i H_i \qquad G_i = G_T \frac{D_i}{\sum D_i}$$

$$\Delta SEL_{distance} = 10\ log_{10}\left(\frac{D}{d_1}\right) = 10\ log_{10}\left(\frac{\frac{d}{M}}{d_1}\right)$$

$$\Delta SEL_{speed} = 30 \log\left(\frac{V}{130}\right)$$

$$SEL = L_{max} + 10\ log_{10}\left(\frac{M}{V}\right) + 10.5 - 10\ log_{10}((4D + (4D^2 + 1) + 2\ tan^{-1}\left(\frac{1}{2D}\right))$$

$$\Delta\theta = 10\ log_{10}\left(\frac{\theta}{\theta_1}\right)$$

$$L_{eq} = SEL - 10\ log_{10}T$$