Second Semester Examination
2021/2022 Academic Session

July/August 2022

EAP318 – Noise Pollution Control

Duration : 1 hour

Please check that this examination paper consists of **FIVE (5)** pages of printed material before you begin the examination.

Instructions: This paper contains **THREE (3)** questions**. SECTION A is COMPULSORY**. Answer **ONE (1)** question in **Section B**.

All questions **MUST BE** answered on a new page.

SECTION A: COMPULSORY

1.   (a)   Draw on the same scale wave diagram of the high frequency-high amplitude and low frequency-low amplitude noise sources.

[4 marks]

(b)   Calculate the speed of a sound in km/hour that travels at a frequency of 8,000 cycles/second and wavelength of 0.15 m.

[4 marks]

(c)   Noise causes devastating physiological and psychological effects to not just human beings but also other creatures including animals and plants. Discuss **FOUR (4)** effects of noise.

[8 marks]

(d)   Describe **THREE (3)** types of sound with their respective sketch of waves and give **ONE (1)** example of each.

[4 marks]

SECTION B: Answer ONE question only

2.   (a)   Given that a Sound Intensity Level from a generator plant is 100 dB. Determine its associated power if the radiating distance is 10 m away from the source.

[8 marks]

(b)   A composite level from 2 noise sources tested in a control room is 81.5 dB (A). If the first level is 80 dB (A), using **Figure 1**, estimate the other noise level if it is lower than the first level.
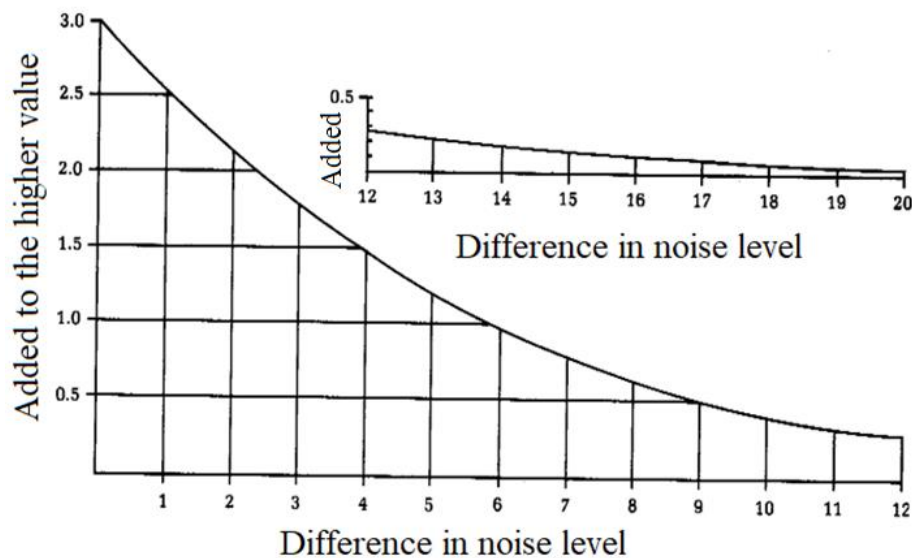
[6 marks]

Figure 1: Summation of the noise level

(c)   There are many types of noise analyses. Define **'Phone'** and state one of its applications in civil engineering.

[6 marks]

…4/-

3.   (a)   Construction works to extend wards in an existing hospital were carried out in an urban area. Daytime construction noise data are shown in **Table 1**. Calculate L_{Aeq} for the tabulated data and comment on the value of L_{Aeq} gained based on Guidelines for Environmental Noise Limits and Control.

[10 marks]

Table 1

Time (minutes)	dB(A)
10	75
20	73
30	71
40	74
50	75
60	77
70	69
80	66
90	70
100	71

(b)   A number of residential areas in Klang Valley are located next to the highway. The noise generated from the traffic has caused disturbances to the residents. Explain **FIVE (5)** possible measures that could be implemented to mitigate the traffic noise.

[10 marks]

APPENDIX

Useful formulae:

1) $C = 20.05\, T^{0.5}$

2) $I = w/s;\quad s = 4\pi r^2$

3) $L_I = 10\, \log_{10}\, I/10^{-12}$

4) $L_p = 20\, \log_{10}\, (P/P_o),\ P_o = 20\ \mu Pa$

5) $L_w = 10\, \log_{10}\, (w/10^{-12})$

6) $L_{eq} = 10\, \log_{10} \sum t_i\, 10^{\,L_i/10}$

7) $L_{wp} = 10\, \log_{10}\, 1/N \sum 10^{(L_j/10)}$

8) $L_{pp} = 20\, \log_{10}\, 1/N \sum 10^{(L_j/20)}$

9) $T_L = 10\, \log 10 \left\{ \dfrac{s}{\tau 1 s 1 + \dots + \tau 2 s 2} \right\}$

10) $T_L = 10\, \log_{10}\, 1/\tau$

10) $NNI =$ Average Peak Noise Level $+ 15\, \log_{10} N - 80$
Average Peak Noise Level $= 10\, \log 10\, 1/N \sum 10^{\,\text{Peak noise level}/10}$ dB (A)

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