
UNIVERSITI SAINS MALAYSIA

2nd. Semester Examination
2002/2003 Academic Session

February / March 2003

EAP 412/3 –

Duration : 3 hours

Instructions to candidates:

1. Ensure that this paper contains **SEVEN (7)** printed pages include appendices.
2. This paper contains **SEVEN (7)** questions. Answer **FIVE (5)** questions only. Marks will be given to the **FIRST FIVE (5)** questions put in order on the answer script and **NOT** the **BEST FIVE (5)**.
3. All questions carry the equal marks.
4. All questions **MUST BE** answered in Bahasa Malaysia.
5. Write answered question numbers on the cover sheet of the answer script.

1. (a) With the help of an example and a sketch, explain how sound wave is generated. (5 marks)
- (b) Give the difference between Sound Pressure Level and Sound Power Level. (5 marks)
- (c) Summed the Sound Power Level and the Sound Pressure Level from the following field data, 100 dB, 75 dB and 64 dB using formula. (5 marks)
- (d) A concrete wall is having a transmission coefficient, $\tau=3.0 \times 10^{-2}$. Another wall (mortar) is having a transmission coefficient, $\tau=2.5 \times 10^{-5}$. Calculate the noise reduction in dB for both walls. (6 marks)
2. (a) In brief, explain the meaning of Noise level (Phone). (5 marks)
- (b) Calculate the values of L_{eq} , L_{10} and L_{90} for the following monitoring data: (10 marks)

Duration (Minutes)	Sound level dB (A)
10	71
20	75
30	70
40	78
50	80
60	84
70	60
80	66
90	67
100	70
110	65
120	67

- (c) Describe **FIVE (5)** methods that normally applied in controlling noise emission from construction activities. (5 marks)
3. (a) A factory emitted air pollutant at 500g/s from its stack. The effective height of the stack is 120 m. On that day, the sun was shining brightly and the wind speed was 4 m/s.
- i. Estimate the maximum concentration of the pollutant in the wind direction,
 - ii. Estimate the concentration of the pollutant if crosswind took place 50m from a downwards distance of 500m from the stack. (8 marks)

(b) With the help of relevant figures, explain the distribution of plume for the following:

- i. Looping
- ii. Lofting
- iii. Fumigation

(9 marks)

(c) The concentration of carbon monoxide at a junction was found to be 60 ppm. At the same time workers from the Department of Irrigation and Drainage, were repairing a leakage in the piping system. Estimate the concentration of carbon monoxide in their blood if they were working hard for 1 hour and 15 minutes.

4. (a) Determine the collection efficiency for a cyclone if the design criteria and data are as follows:

average diameter size = 7.5 μm

gas flow, $v_i = 15 \text{ m/s}$

ρ_p , density of particulate = 1.7 g/cm^3

Effective number of turns, $N_e = 12$

Gas viscosity, $\mu = 0.748 \text{ kg/m.hr}$

(8 marks)

(b) Explain briefly **ONE(1)** method to control air particulate and another **ONE (1)** method to control a named gas.

(6 marks)

(c) Explain **THREE (3)** laws/ legislations available in Malaysia to control air pollution.

(6 marks)

5. (a) A slaughter house has to install a wastewater treatment plant.

i. What would be the expected characteristics of the wastewater?

(4 marks)

ii. Suggest a possible flow diagram for the treatment of the wastewater.

(6 marks)

(b) The following results were obtained from a survey of the wastewater discharge from a factory:

Time	Flow, l/s
8 am – 12 noon	70
12 noon – 4 pm	100
4 pm – 8 pm	40
8 pm – 12 midnight	100
12 midnight – 4 am	130
4 am – 8 am	60

Determine:

- i. The in-line storage volume required for an equalization tank so that a constant outflow from it can be maintained. (8 marks)
- ii. The hydraulic retention time of the tank at the average flow. (2 marks)

6. (a) Describe any **TWO (2)** of the following in the context of waste treatment:

- i. Composting
 - ii. Pyrolysis
 - iii. Equalisation tank
 - iv. Floatation
- (10 marks)

The following table shows the results of a column analysis that was used to determine the settling characteristics of an activated sludge suspension.

MLSS Concentration, mg/l	1000	2000	3000	4000	5000	6000
Settling velocity, m/h	3.5	1.6	0.6	0.3	0.1	0.05

If the influent to the secondary clarifier is 4000 m³/d with an MLSS concentration of 3000 mg/l, determine the diameter of the clarifier if the sludge is to be thickened to a concentration of 8000 mg/l.

(10 marks)