



**UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY**

**FINAL EXAMINATION
JANUARY 2016 SEMESTER**

COURSE CODE	:	JCB 30203
COURSE TITLE	:	ENVIRONMENTAL ANALYSIS PRINCIPLES AND MEASUREMENT
PROGRAMME LEVEL	:	BACHELOR
DATE	:	24 MAY 2016
TIME	:	9.00 AM – 12.00 PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper **CAREFULLY**.
2. This question paper is printed on both sides of the paper.
3. This question paper consists of **TWO (2)** sections.
4. Answer **ALL** questions in Section A. Choose **FOUR (4)** questions in section B.
5. Please write your answers on the answer booklet provided.
6. Please answer all questions in English only.

THERE ARE 5 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

(a) Define chromatography.

(2 marks)

(b) There is several factors that affect the Retention Time (R_t) of Gas Chromatography for hydrocarbon analysis. Discuss the factors listed below:

- i. Molecular Weight
- ii. Boiling point

(4 marks)

(c) Analyze and briefly discuss **FIVE (5)** basic components of a Gas Chromatography.

(5 marks)

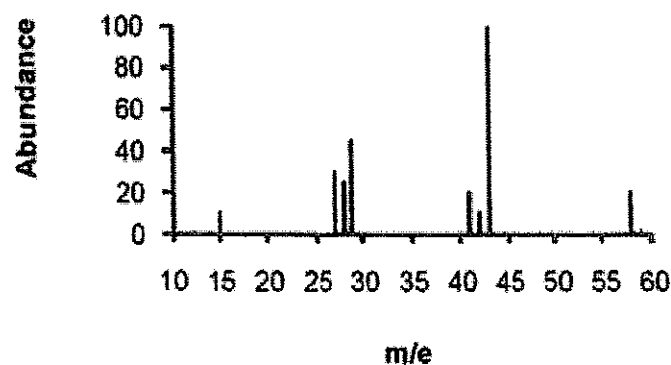
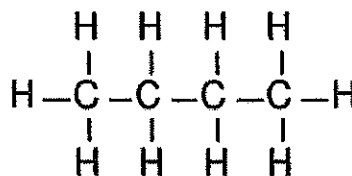


Figure 1: Chromatogram result

(d) The structure shown in Figure 1 is the mass spectrum for n-butane. Imagine how this molecule might break apart. Draw structures of the fragments responsible for the peaks at masses 15, 29, 43, and 58.

(4 marks)

Question 2

- (a) Define Intermediate Treatment in Solid Waste Management. (1 marks)
- (b) State the waste hierarchy for Solid Waste Management target in year 2020. (5 marks)
- (c) Analyze **THREE (3)** benefits of National Recycling Program. (3 marks)
- (d) Suggests **SIX (6)** general steps need in order to develop a recycling business plan. (6 marks)

Question 3

- (a) Define noise in Environmental Monitoring. (3 marks)
- (b) State **THREE (3)** examples of environmental noise that produce from industrial sites or construction work source. (3 marks)
- (c) Draw a schematic diagram to show the components of Sound Level Meter (SLM). (5 marks)

Table 1: Correction chart of noise

Addition of Decibels		Subtraction of Decibels	
$L_2 - L_1$ (dBA)	ΔL (dBA)	$L_{S+N} - L_N$ (dBA)	ΔL_N (dBA)
0	3.0	0.0 – 1.0	7
0.1 - 0.9	2.5	1.1 – 1.9	5.5
1.0 - 2.4	2.0	2.0 – 3.0	3.5
2.4 - 4.0	1.5	3.1 – 4.0	2.5
4.1 - 6.0	1.0	4.1 – 4.9	1.8
6.1 - 10	0.5	5.0 – 5.9	1.4
10	0.0	6.0 – 6.9	1.1

- (d) In metal fabrication industry, noise level of a cutting machine is 85 dBA and a pressing machine is 89 dBA. By using the correction chart shows in Table 1, calculate the total noise exposure to the worker's by the machine if the background noise is 83 dBA.

(4 marks)

Question 4

(a) Define each of terms below:

- i. Air pollution
- ii. Particulate

(4 marks)

(b) Identify **ONE (1)** natural source and **ONE (1)** anthropogenic source of air pollutants in order to differentiate between these two sources of pollutants.

(2 marks)

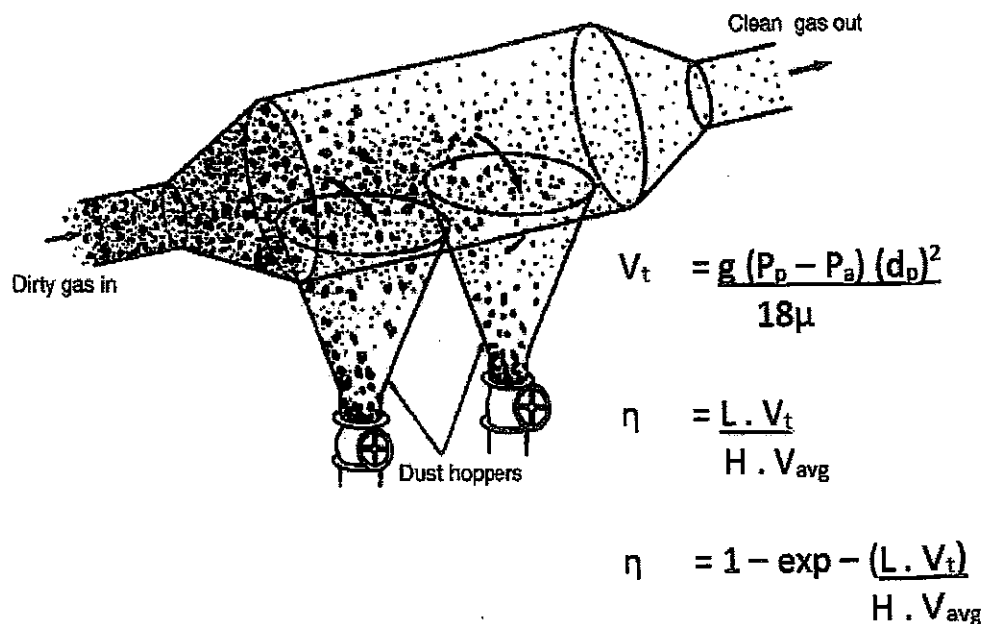


Figure 2: Schematic diagram of a typical gravity settler

(c) According to the Figure 2, compute the efficiency for a gravity settler if the particle and gases moving on the same speed. The gravity settler has $H = 2$ m, $L = 10$ m, $V_{avg} = 1$ m/s, and the estimated particle size is 50μ at 27°C . Also calculate the efficiency for the gravity settler if the particle moving not the same speed with gases.

Where,

Gravitational constant = 9.81 m/s^2

Density of the particle = 2000 kg/m^3

Density of air = 1.2 kg/m^3

Viscosity of air at room temperature = $1.85 \times 10^{-5} \text{ kg/m.s}$

(9 marks)

SECTION B (Total: 40 marks)**INSTRUCTION: Answer FOUR (4) questions ONLY.****Please use the answer booklet provided.****Question 1**

- (a) Differentiate between non-point sources and point sources. State **ONE (1)** example for every source.
(4 marks)
- (b) Analyze and explain either point or nonpoint pollution can be control
(2 marks)
- (c) Suggest a method to predict long-term nonpoint source pollution. Discuss the application.
(4 marks)

Question 2

- (a) Define unconfined aquifer and confined aquifer.
(4 marks)
- (b) A group of students' conduct a field work to measuring the soil matric potential using a tensiometer. The data collection shows there is a 0 (zero) value, positive value and negative value. Analyze the data.
(6 marks)

Question 3

- (a) There are several principal objective of wastewater treatment. Analyze and explain **THREE (3)** principles of wastewater treatment facilities.
(6 marks)
- (b) Lists a regulation under Environmental Quality Act, 1974 that related to effluent to be discharged into Malaysian waters and discuss the applications of this legislation.
(4 marks)

Question 4

- (a) Determine **TWO (2)** main units under primary treatment and discuss the functions of each unit.

(4 marks)

- (b) Design a schematic diagram to show the typical treatment processes in the conventional wastewater treatment plant using complete-mix activated sludge to provide secondary treatment.

(6 marks)

Question 5

- (a) Briefly explain the significant of wastewater test listed:

- i. Total solids (TS)
- ii. Turbidity

(4 marks)

- (b) The average concentration of total solids and suspended solids are 1127.61 mg/l and 345.14 mg/l respectively. Based on the following test data, calculate the X value, Y value and Total dissolved solids (TDS).

Table 2: Experimental data

	Value
Weight of empty dish (mg)	52,660
Weight of dish with sample (mg)	104,000
Weight of dish with dry sample (mg)	X
Weight of filter paper (mg)	116.7
Weight of filter paper with sample (mg)	234.56
Weight of filter paper with dry residue (mg)	Y
Sample volume (L)	0.1

(6 marks)

END OF EXAMINATION PAPER