

POLITEKNIK
Jabatan Pengajian Politeknik

EXAMINATION AND EVALUATION DIVISION
DEPARTMENT OF POLYTECHNIC EDUCATION
(MINISTRY OF HIGHER EDUCATION)

CIVIL ENGINEERING DEPARTMENT

FINAL EXAMINATION

JUNE 2012 SESSION

CN301: GEOENVIRONMENTAL ENGINEERING

DATE: 17 NOVEMBER 2012

DURATION: 2 HOURS (8.30 – 10.30 AM)

This paper consists of **SIX (6)** pages including the front page.
Section A: Objective (20 questions – answer **ALL**)
Section B: Essay (4 questions – answer **3** questions)

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THE CHIEF INVIGILATOR

(The CLO stated is for references only)

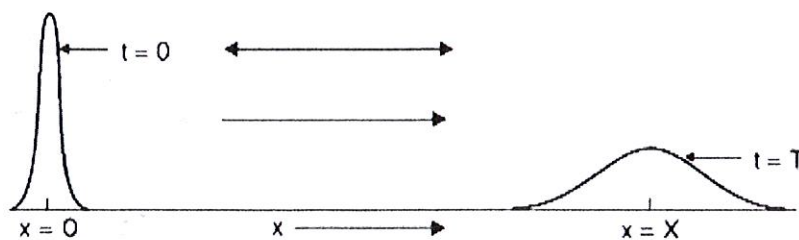


SECTION A

OBJECTIVES (40 marks)

Instruction: This section consists of 15 questions fill in the blank and five (5) True or False questions. Write your answer's in the answer booklet.

1. The sources of pollution from industrial areas are _____ CLO 1 : C1
and _____.
2. The molecule structure of silica tetrahedron consists of _____ CLO 1 : C1
and _____.
3. The natural agents in the erosion process of weathering rocks are _____ CLO 1 : C2
_____ and _____.
4. The definition of Diffusion is _____ CLO 1 : C1
_____.
5. In groundwater systems, the contaminant phases are referred to _____ CLO 1 : C2
as _____.
6. The figure of mass transport below is show of _____ and _____ CLO1 : C3
_____.



7. The two groups of mass transfer are _____ CLO 1 : C2
and _____.

8. The geology site assessment should include a description of _____ CLO2 : C2
9. The composite sampling consists of _____ CLO 2 : C2
10. **TWO (2)** tool for Soil permeability Method are _____ CLO2 : C2
and _____.
11. *“A system diagram identifying contaminant sources, routes of exposure (pathways), and what receptors are affected by contaminants moving along those pathways.”*
This site investigation statement is referring to _____.
12. The **TWO (2)** Bioventing treatment are _____ CLO2 : C2
and _____.
13. The **TWO (2)** Thermal treatment Technologies are _____ CLO 2 : C2
and _____.
14. The advantages of Solidification/Stabilization treatment is _____ CLO2 : C3
15. The **TWO (2)** collection layers in the leachate collection system (LCS) are _____ and _____ CLO 2 : C2

16. Soil pollution is defined as the build-up in soils of persistent toxic compounds, chemicals, salts, radioactive contaminants below the ground surface.
(TRUE or FALSE) CLO 1 : C2
17. The grading of gravels and sands may be qualified in the field as *well graded* (good representation of all particle sizes from largest to smallest).
(TRUE or FALSE) CLO 1 : C2
18. Hydraulic gradient can show the direction of dissolved contaminant transport.
(TRUE or FALSE) CLO 1 : C2
19. Site investigation has been defined as investigation of the physical characteristics of the site and includes documentary studies, site surveys and ground investigation.
(TRUE or FALSE) CLO 1 : C2
20. In situ soil vapor extraction (SVE) is a remediation technology in which typically involves reduction/ oxidation (redox) reactions that chemically convert hazardous contaminants to nonhazardous or less toxic compounds that are more stable, less mobile, or inert.
(TRUE or FALSE) CLO 1 : C2

SECTION B**ESSAY (60 marks)**

Instruction: This section consists of 4 essays questions. Answer **THREE (3)** questions only.

QUESTION 1

- (a) Explain briefly the related legislation for management of soil pollution and contaminated land in Malaysia. CLO 2 : C3
(9 marks)
- (b) In general, five independent variables may be viewed as governing soil formation. Explain briefly the soil-forming factors. CLO 2 : C4
(11 marks)

QUESTION 2

- (a) A cubic meter of a gravel-sand aquifer has been contaminated with 30 L of tetrachloroethylene. If the amount of tetrachloroethylene dissolves in aquifer water is 20 percent of its aqueous solubility. CLO 2 : C4
(8 marks)
- i. How much tetrachloroethylene is dissolved?
ii. How much remains as undissolved DNAPL mass?
iii. If the aquifer has gradient of 0.003, use the porosity (30%) and hydraulic conductivity for gravel and sand aquifer (410 m/day) to estimated the average linear velocity of the groundwater.
(average linear velocity, $v = KV * \Delta h/L * 1/n$)
iv. How long would it take to remove the tetrachloroethylene?
(Tetrachloroethylene has specific gravity =1.63, Aqueous Solubility = 1.5×10^2 mg/L)
- (b) Explain briefly the process of waste mixes with soil CLO 2 : C4
(12 marks)

QUESTION 3

- (a) List **TWO (2)** geophysical methods and explain briefly the advantages and limitation of it. CLO 3 : C3
(8 marks)
- (b) Explain briefly **THREE (3)** phase of environmental site assessment (ESA). CLO 3 : C3
(12 marks)

QUESTION 4

- (a) Explain briefly **ONE (1)** of the Phytoremediation treatment CLO 3 : C3
(10 marks)
- (b) Describe briefly the issue or factor to be consideration on the Risk Assessment below: CLO 3 : C2
(10 marks)
- i. Human-health related toxicity test
 - ii. Evaluating an ecological hazard

