



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

**FINAL EXAMINATION
JANUARY 2016 SEMESTER**

COURSE CODE : JFB 30303
COURSE TITLE : WATER AND WASTE TREATMENTS
PROGRAMME LEVEL : BACHELOR
DATE : 31 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 6 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)**INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

- (a) There are several principal objectives of wastewater treatment. Identify **THREE (3)** advantages of wastewater treatment facilities. (3 marks)
- (b) Wastewater treatment processes consists of *primary, secondary and tertiary* treatment processes. Briefly explain the objectives of each treatment process. (6 marks)
- (c) Define **THREE (3)** main units under the *secondary* treatment and discuss their functions. (6 marks)

Question 2

- (a) In short description, analyze the purpose of maintenance and troubleshooting in wastewater treatment plant. (3 marks)
- (b) Determine **THREE (3)** importance of maintenance in wastewater treatment plants (WWTPs). (6 marks)
- (c) Suggest the suitable maintenance for each of the equipment in wastewater treatment plants (WWTPs).
- i. Pump
 - ii. Tank
 - iii. Mixer & Motor
- (6 marks)

Question 3

- (a) Monitoring the effluent quality is considered as one of general inspection procedures in wastewater treatment plants (WWTPs). The sample collected must be *representative, reproducible, defensible, and useful* in order to meet the goals of the sampling program. Briefly explain each of analytical procedure for the data collected.
(8 marks)
- (b) Differentiate between the *grab* and *composite* influent sampling in wastewater treatment plants (WWTPs).
(4 marks)
- (c) Analyze **TWO (2)** common problems faced in wastewater treatment plants (WWTPs).
(3 marks)

Question 4

- (a) Define *Sewage* according to Sewage and Industrial Effluents Regulations, 1979.
(2 marks)
- (b) In Malaysia, the legislations related to wastewater is Environmental Quality (Sewage and Industrial Effluents) Regulations, 1979. Discuss the applications of this legislation.
(2 marks)
- (c) In Regulation 8 which is parameter limits of effluent to be discharged into inland waters in Environment Quality (Sewage and Industrial Effluent) Regulation, 1979 already listed several item that needs to be followed about discharging effluent in Third Schedule, Fourth Schedule and Fifth Schedule. Based on your understanding, analyze the content of *Fourth Schedule*.
(4 marks)
- (d) As an environmental officer, you received a report that a livestock compound operating in one area made an extension to its compound without any approval from local authority. It's been suspected that this compound also make an improper effluent discharge from its compound to the river through land area near it. There are 7 sampling protocols that must be developed along with a quality assurance project plan (QAPP or previously known QA/QC) before the investigation is carried out. Analyze the sampling protocol that needs to be considered before the investigation starts.
(7 marks)

SECTION B (Total: 40 marks)

INSTRUCTION: Answer FOUR (4) questions ONLY.

Please use the answer booklet provided.

Question 1

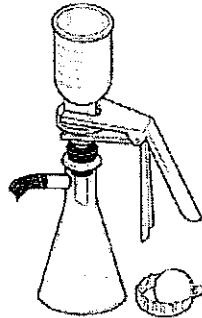


Figure 1: Total suspended solids (TSS) test

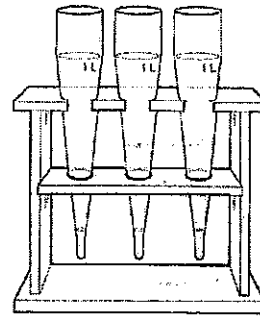


Figure 2 : Settleable solids (SS) test

- (a) Figure 1 shows the apparatus used for the determination of total suspended solids (TSS) in wastewater whilst Figure 2 shows the imhoff cone used to determine settleable solids (SS) in wastewater. Conclude the use or significance of the test results.

(4 marks)

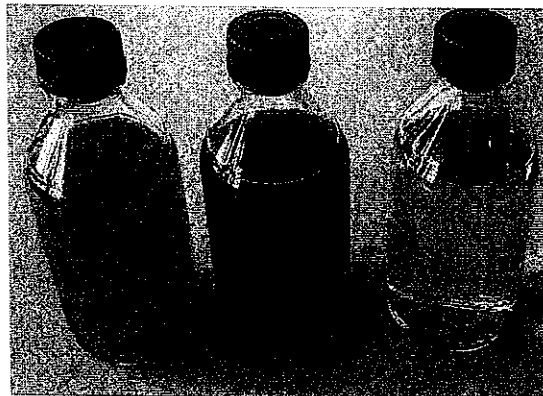


Figure 3: Wastewater sample

- (b) The picture shows in Figure 3 is taken by your friend during a visit at Bukit Indah Wastewater Treatment Plant. Briefly analyze the location or treatment process that the wastewater samples undergo based on their colors.

(6 marks)

Question 2

(a) In wastewater, many of the microbes present are beneficial to breakdown the organics material into sludge. Discuss briefly the digestion of each:

- i. Aerobic bacteria
- ii. Anaerobic bacteria

(4 marks)

(b) The temperature of wastewater is a very important parameter because of its effect on chemical reactions, aquatic life, and the suitability uses of the wastewater. In wastewater treatment plant, determine the optimum temperature that is suitable for aerobic digestions in wastewater.

(2 marks)

(c) Analyze the process description of pH adjustment and suggest the suitable pH for wastewater treatment plant.

(4 marks)

Question 3

(a) Design a suitable sketch to describe the operation of an aerated lagoon.

(6 marks)

(b) Describe **FOUR (4)** disadvantages of aerated lagoon.

(4 marks)

Question 4

- (a) The following test results were obtained from a wastewater sample taken at the headworks to a wastewater treatment plant. All of the tests were performed using a sample size of 0.075 L. Based on the following test data, calculate the Total Solids (TS), Total Suspended Solid (TSS) and Total Dissolved Solid (TDS).

Table 1: Experimental data

	Value
Tare mass of evaporating dish	60,542 mg
Mass of evaporating dish plus residue after evaporation at 105°C	60,578 mg
Tare mass of Whatmann GF/C filter after drying at 105°C	1,543 mg
Mass of Whatmann GF/C filter and residue after drying at 105°C	1,555 mg

(8 marks)

- (b) In a wastewater quality test, the measured value of turbidity (T) is 47.38 NTU. Estimate the total suspended solids value, TSS (mg/L) if the TSS factor is 1.33 (mg/L TSS per NTU).

(2 marks)

Question 5

- (a) The average concentration of total solids and suspended solids are 1327.61 mg/l and 355.14 mg/l. respectively. Based on the following test data, calculate the X value, Y value and Total dissolved solids (TDS).

Table 2: Test Data

	Value
Weight of empty dish (mg)	52,650
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

(8 marks)

- (b) In a wastewater quality test, the measured value of electrical conductivity (EC) is 73.33 $\mu\text{mho/cm}$. Estimate the TDS (mg/L) by considering the TDS factor is 0.65 (mg/L TDS per $\mu\text{mho/cm}$).

(2 marks)

END OF EXAMINATION PAPER

