

FACULTY OF CIVIL ENGINEERING, UTM
SKAA 2922 WASTEWATER ENGINEERING
SEM 2015/2016-2

TEST 2

1 HOUR

ANSWER ALL QUESTIONS

PART A

1. There are four components in sewage treatment process. The initial component is the preliminary treatment. In brief, describe all stage of processes that involve in the preliminary treatment.

(4 marks)

2. List two (2) purposes of aeration in activated sludge system. Explain consequences when the aeration is limited in the system.

(4 marks)

3. Explain three (3) advantages of plastic media over stone media used in trickling filters.

(3 marks)

4. Explain briefly how does microorganism play the roles in trickling filter system? Make a clear sketch to explain your answer.

(3 marks)

PART B

1. Two primary clarifiers are designed to operate in parallel for treating sewage from 20,000 PE.

Based on the following information:

Side water depth = 3 m

Surface overflow rate = $45 \text{ m}^3/\text{m}^2 \cdot \text{day}$

- (i) Determine the diameter and hydraulic retention time of each tank.
- (ii) Determine whether the tank fulfill the design requirement.

(8 marks)

2. A completely mixed activated sludge process is designed for 100,000 PE, at 90 percent BOD removal efficiency. The design parameters are as follows:

Volume of aeration tank	: 3750 m^3
Sludge concentration in aeration tank	: 3,000 mg/L
Concentrated sludge in secondary clarifier	: 13,000 mg/L
Y	: 0.5 kg/kg
k_d	: 0.06/day

If the BOD concentration after primary clarifier is 200 mg/L, determine:

- a) HRT of aeration time
- b) F/M ratio
- c) Mean cell-residence time
- d) Flow rate of wasted sludge
- e) Flow rate of sewage effluent from final clarifier

(8 marks)