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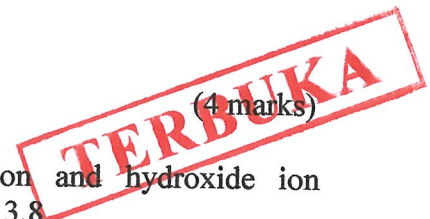
**FINAL EXAMINATION
SEMESTER I
SESSION 2017/2018**

COURSE NAME : WASTEWATER TREATMENT
TECHNOLOGY
COURSE CODE : DAK 20803
PROGRAMME : DAK
EXAMINATION DATE : DECEMBER 2017/ JANUARY 2018
DURATION : 3 HOURS
INSTRUCTION : ANSWER **FOUR (4)** QUESTIONS
ONLY

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

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- Q1** (a) Explain the sewage discharge of Standard A and Standard B in Environmental Quality Act 1974. (4 marks)
- (b) Wastewater is discharged from homes, commercial establishments and industrial plants by means of sanitary sewers. Distinguish between domestic and industrial wastewater. (9 marks)
- (c) Sewerage systems are divided into two types which are combine sewer and separated sewer.
- (i) State the definition of both sewer system. (4 marks)
- (ii) Differentiate both system in **Q1 (c) (i)** by illustration of diagrams clearly. (8 marks)
- Q2** (a) Describe how color of wastewater can be related with physical parameter. (4 marks)
- (b) Organic oxygen demand usually measured to determined amount of oxygen consume during degradation in natural water.
- (i) Differentiate between pH and alkalinity. (4 marks)
- (ii) Calculate the hydrogen ion concentration and hydroxide ion concentration in apple juice having a pH of 3.8. (8 marks)
- (c) Water quality are divided into three parameters including physical, biological and chemical characteristics. Explain **THREE (3)** types of bioindicators parameters. (9 marks)



- Q3** (a) (i) Define the term of equalization in wastewater treatment process.
(1 marks)
- (ii) Describe **FIVE (5)** importance of equalization process in wastewater treatment system.
(5 marks)
- (b) (i) Illustrate how the waste load reduction in wastewater treatment process.
(6 marks)
- (ii) Analyze the waste load reduction in a wastewater treatment process from **Q3 (b) (i)** in terms of organic matter.
(6 marks)
- (c) A grit chamber to remove sand particle have a diameter of 0.3 mm with a density of particle is 2650 kg/m^3 . Assuming the sand is spherical and the temperature of the wastewater is $20 \text{ }^\circ\text{C}$. The wastewater flow is $15\,000 \text{ m}^3/\text{d}$. A flow through velocity of 0.4 m/s will be automatically maintained, and the width at the maximum flow must be 1.5 of the depth. Calculate the width and depth of the grit chamber.
(7 marks)

TERBUKA

- Q4** (a) Distinguish between aerobic decomposition (AD) and anaerobic decomposition (AnD) in secondary treatment systems. (4 marks)
- (b) A food processing plant of Industri Kecil dan Sederhana (IKS) in Parit Raja Johor has generated 925 m³/s of wastewater each day with Biological Oxygen Demand (BOD) before primary settling is 1200 mg/l and suspended solids of 540 mg/l. The wastewater were then treated using an activated sludge system with an aerated tank with dimension of 8 m width, 10 m long and 4 m depth. Soluble BOD₅ is 200 mg/l with suspended solid of 100 mg/l after primary settling and 1800 mg/l of MLVSS (X) entering the activated sludge system.
- (i) Calculate the removal efficiencies of BOD and suspended solids in tank. (6 marks)
- (ii) Determine the aeration period in hour. (5 marks)
- (iii) Calculate the Food-to-microorganism (F/M) ratio. (5 marks)
- (c) Demonstrate FIVE (5) characteristic phases of the growth curve for bacterial population. (5 marks)
- Q5** (a) List the sources of sludge production from the wastewater treatment process. (4 marks)
- (b) Briefly explained the characteristics of sludge produced from different processes in wastewater treatment system. (4 marks)
- (c) Illustrate the process flow of sludge handling in wastewater treatment plant. (9 marks)
- (d) Sludge from a wastewater treatment must be disposed accordingly to minimize the environmental hazards. Analyze some available route for the sludge disposal from wastewater treatment plant. (8 marks)

-END OF QUESTIONS-