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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2016/2017**

COURSE NAME : WASTEWATER TREATMENT
TECHNOLOGY

COURSE CODE : BNA 40603

PROGRAMME CODE : 4BNA

EXAMINATION DATE : JUNE 2017

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

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THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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- Q1**
- (a) Briefly explain the differences between domestic and industrial wastewater. (4 marks)
 - (b) Discuss **THREE (3)** environmental impacts due to pollutants from untreated wastewater discharge. (6 marks)
 - (c) Briefly explain with an aid of sketches a combined and separated sewer collection system for sanitary wastewater and stormwater. (5 marks)
 - (d) Crown corrosion is a problem related to reaction of sulphate reduction bacteria with wastewater in sewer line. Discuss this phenomenon. (5 marks)
 - (e) Discuss the important of lift station and list the components required in lift station. (5 marks)
- Q2**
- (a) State the objectives of screening including design criteria for coarse and fine screens. (4 marks)
 - (b) Sketch the typical unit processes in treating municipal wastewater and state the objectives of pretreatment including screening and grit chamber in a wastewater treatment processes. (6 marks)
 - (c) Discuss the waste load reduction in a wastewater treatment processes from the influent towards the secondary treatment prior discharge to the surface water in terms of organic matter. (6 marks)
 - (d) Design a primary settling tank is to handle maximum hourly wastewater flow of 0.6 m³/s at an overflow rate of 62 m³/d/m²/day as the following:
 - (i) The surface area of the tank
 - (ii) The hydraulic detention time (HRT) if the tank depth is 3.5 m.
- Give comments on your HRT value either within the acceptable range or not as the design criteria for HRT is between 1.5-2.5 hrs. (9 marks)

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- Q3** (a) Define the following terms of secondary treatment systems by giving **ONE (1)** example each:
- (i) Suspended growth
 - (ii) Attached growth
- (4 marks)
- (b) Predict the pathway of organic matters from wastewater in an oxidation ditch system due to the presence of microorganism under aerobic conditions.
- (5 marks)
- (c) A slaughterhouse generated 1036.8 m³/d of wastewater each day. The average BOD₅ of the raw wastewater before primary settling is 1400 mg/L. The aeration tank has effective dimensions of 8.0 m wide by 8.0 m long by 5.0 m deep. Soluble BOD₅ after primary settling and MLVSS (X) entering the activated sludge system are 966 mg/L and 2000 mg/L, respectively. Determine the aeration period and F/M ratio.
- (6 marks)
- (d) Recommend a complete wastewater treatment system for treating any **ONE (1)** of the following industries prior to be discharged to the river. Additional explanation of pollutants removal in each stage of the treatment should be included.
- (i) Textile industry
 - (ii) Food processing industry
 - (iii) Palm oil mill industry
 - (iv) Manufacturing industry
- (10 marks)

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- Q4**
- (a) Briefly explain the characteristics of sludge produced from primary and secondary clarifier in a wastewater treatment system. (4 marks)
 - (b) Propose **TWO (2)** of the treatment methods of sludge produced from a wastewater treatment plant. (6 marks)
 - (c) A 2-L graduated cylinder was used to determine Sludge Volume Index (SVI) of an activated sludge sample. The settled volume was 850 ml and the MLSS was 3,000 mg/L. what was the SVI value? Comment on sludge settling rate. (6 marks)
 - (d) Sludge from a wastewater treatment must be disposed accordingly to minimize the environmental hazards. Discuss **THREE (3)** of the options available for sludge disposal. (9 marks)

- END OF QUESTIONS-

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