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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2014/2015**

COURSE NAME	:	WASTEWATER TREATMENT TECHNOLOGY
COURSE CODE	:	DAK 20803
PROGRAMME	:	2 DAK
EXAMINATION DATE	:	DECEMBER 2014 / JANUARY 2015
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER FOUR (4) QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF FOUR (4) PAGES

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- Q1**
- (a) Define the terms domestic and industrial wastewater. (4 marks)
 - (b) Briefly explain the differences between domestic and industrial wastewater. (4 marks)
 - (c) Discuss the environmental impacts due to untreated wastewater discharge. (5 marks)
 - (d) List the **FOUR (4)** significant contaminants in wastewater and their related problems towards the environment. (6 marks)
 - (e) Explain briefly with an aid of a sketch the Standard A and Standard B for effluent discharge standards to Malaysia inland water under Environmental Quality (Sewage) Regulations 2009. (6 marks)
- Q2**
- (a) Briefly define the physical, chemical and biological water quality parameters by giving **ONE (1)** example for each parameter. (6 marks)
 - (b) Define pH and calculate hydrogen ion concentration $[H^+]$ in mg/L for a wastewater sample with pH 5.6. (6 marks)
 - (c) Organic oxygen-demanding materials are commonly measured by determining the amount of oxygen consumed during degradation in an approximate manner of degradation in natural waters.
 - (i) Define Biochemical Oxygen Demand (BOD) (1.5 marks)
 - (ii) Define Chemical Oxygen Demand, COD. (1.5 marks)
 - (iii) Differentiate between biochemical oxygen demand (BOD) and chemical oxygen demand (COD). (2 marks)

- (iv) Calculate the BOD for a wastewater sample with dissolved oxygen depletion of 5 mg/L and dilution factor (p) value of 0.1 for a standard BOD test using 300 ml BOD bottle. (2 marks)
- (d) Pathogens are microorganisms that will cause human or animal diseases by colonizing the intestinal tract. State **THREE (3)** of these pathogens and their related diseases. (6 marks)
- Q3** (a) State the 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. (8 marks)
- (c) Briefly discuss the importance of equalization basin to the wastewater treatment system. (6 marks)
- (d) Briefly discuss the waste load reduction in a wastewater treatment processes from the influent towards the secondary treatment prior to discharge to the surface water in terms of organic matter. (7 marks)

- Q4**
- (a) Define the suspended growth and attached growth systems by giving **ONE (1)** examples each. (4 marks)
 - (b) List **FIVE (5)** most abundant microorganisms in an activated sludge system. (5 marks)
 - (c) Briefly discuss **TWO (2)** roles of microorganism in a secondary wastewater treatment. (6 marks)
 - (d) A slaughterhouse generated $1036.8 \text{ m}^3/\text{d}$ of wastewater each day. The average BOD_5 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 BOD_5 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. (10 marks)
- Q5**
- (a) List the sources of sludge production from the wastewater treatment processes. (4 marks)
 - (b) Briefly explain the characteristics of sludge produced from different processes in a wastewater treatment system. (6 marks)
 - (c) Briefly describe the treatment method of sludge produced from a wastewater treatment system. (7 marks)
 - (d) Sludge from a wastewater treatment must be disposed accordingly to minimize the environmental hazards. Briefly discuss the options available for sludge disposal. (8 marks)

-END OF QUESTIONS