Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
300 Level 2nd Semester Examination – Sep./Oct. 2015
MRT 381-3: Water Treatment Methods

Uva Wellassa University

Duration: 03 hours
Number of questions: 03
Answer all questions
Mark allocation: 100
Use standard symbols/ abbreviations without a definition

PART - A

1. The following water quality results were obtained for River Mahaweli by a chemical laboratory of a water regulating agency in Sri Lanka.

	Min	Max
Turbidity / (NTU)	-30	150
pH	- 6.0	7.5
DO / (mg/l)	- 5.6	6.4
SS / (mg/l)	- 55	270
Color (Pt-Co)	- 15	35
Conductivity (µS/cm)	- 100	220

a. Describe the pollution level of above water based on the given details. What are the key parameters considered in water treatment process design? (10 mark)

b. What type of unit processes you would like to propose to treat the above water to meet the SLS water quality parameters for drinking water as given below.

(10 mark)

Parameter	SLS 614: Part 1 & 2		
	Units	Maximum desirable level	Maximum permissible level
Colour	Pt-Co	5	30
Turbidity	NTU	2	8
pH		6.5	9.0
Conductivity at 25 °C	µS/cm	750	3500

c. Propose and sketch the schematic diagram of a treatment facility to treat above water from River Mahaweli and justify each treatment unit for its applicability and functionality in the proposed process.

(10 mark)

42

2. Assume that you are a process design engineer and have been asked to design a water treatment process for the water body shown in Section I. You are needed to sedimentation tanks and filters.

Design data

No of families in the area	- 10,000
No of average persons in a single family	- 05
Per capita consumption of water	- 140 – 180 l/day/head
Commercial water requirement	- 30 % of the domestic requirement
Intuitional and other requirement	- 25% of the domestic requirement

a. Find out the total domestic demand in the area and hence calculate the total water requirement in the proposed service area. (15 mark)

b. Design the sedimentation tanks dimensions (width, length and height) based on the following guidelines. (15 mark)

Parameter	Design value
Surface loading rate ($m^3/m^2.d$)	**20 - 60**
Mean horizontal velocity (m/min)	**0.15 - 0.90**
Water depth (m)	**2-3**
Detention time (h)	**2-4**
Weir loading rate ($m^3/m.d$)	**100 - 200**
Solid loading rate ($kg/m^2.d$):	
+ Primary sedimentation	**15 - 34**
+ Secondary clarifier	**49 - 98**

c. Calculate the width and length of filters. Assume filter media height as 1200 mm and they are packed on a concrete slab with air nozzles placed at equal distances.

Clue: Use the filtration rate as 120 $m^3/m^2/day$ (10 mark)

42

PART - B

3.

Part I

Sri Lanka is being faced many water quality issues in the recent past. However, most of them are still remained as unresolved.

a. Describe your responsibility as a young water treatment expert with the suggestions to minimize the impacts in drinking water. Give examples on recent incidents caused water pollution. (15 mark)

Part II

b. The scarcity of water linked with the challenges faced with the effects of global warming and the resulting climatic changes. As a water professional describe briefly methods of combating water scarcity as a result of global warming. (15 mark)