Mansoura University
Faculty of Eng.
Public Works Eng. Dept.



4th year, Civil Eng. Sanitary Eng. Time: 3.0 Hrs

رابعة مدنى - 2013 - 2-6

General Instructions

(الامتحان في صفحتين + صفحتين منحنيات)

The total marks of the exam is (90) marks
Any missing data can be reasonably assumed

1- a) Describe with neat sketch for the following:

<u>(8 marks)</u>

- Horizontal and vertical baffling type flocculator.

-Velocity Gradient (G).

- inlet and outlet zones of rectangular sedimentation tank.

- tapered flocculation.

b) Mark ($\sqrt{\ }$) the correct sentence and (X) the wrong one with the correction

(4 marks)

-Friction coefficient (C) whose value depends on the type pipe only.

-The optimum pH range for ferric sulfate must be raised to 9.5.

-The zeta potential is a direct measure of the electrical charge of the colloidal particle.

-Colloids - so small: gravity settling is not possible.

- 2-a) Design a rectangular flocculator sedimentation tank for supplying water to population of 80000 capita with an average water consumption of 220 l/c/d. Assume for sedimentation tank, surface loading rate of 30 m³/m²/d and detention time = 2.5 hrs. (7 marks)
 - b) A flocculator basin in figure is rotated through water with an angular speed 5.0 rpm. If the flow is $12000 \text{ m}^3/\text{d}$ and $Gt = 4.5 \times 10^4 \text{ g}$

 $(\mu = 1.002 \times 10^{-3} \text{ N.S/m}^2)$, determine:

- the basin dimensions.

- the power dissipated into water,

- the paddle configuration,

Sec. S.V. Q = 30 Q = 30

- 3- a) Draw cross section elevation of dual-medium gravity rapid filter showing all pipes and valves. (2 marks)
 - b) Explain the purpose of the different locations of disinfectant injection in the water supply systems. (2 marks)

(6 marks)

c) A water treatment plant produce 100000 m³/d. The dual media filter unit has an area of 48 m², its filtration rate is 9.0 m/hr, the water backwash rate is 26 m³/m²/hr for 12 minutes.

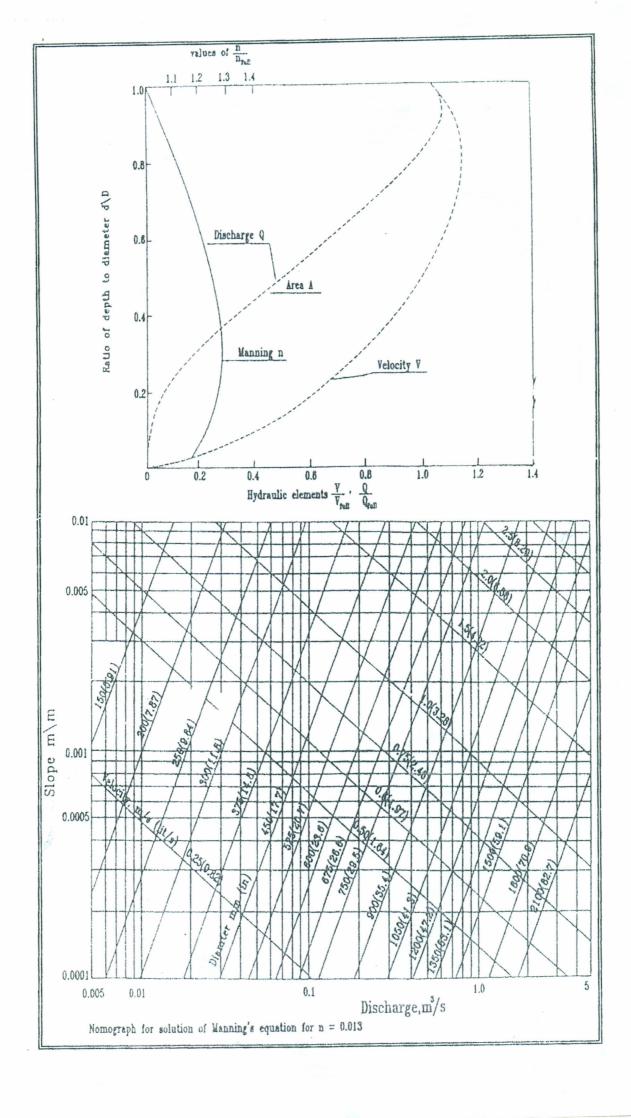
1. Determine the total number of filter units. (2 marks)

- 2. Determine quantity and percent of backwash water. (2 marks)
- 4-a) Draw the cross section elevation of balancing elevated tank showing all pipes and valves. (2 marks)
 - b) A city with a population of 0.50 million has a continuous water supply. The average daily demand of the capita in this town is 200 l/d consumed as shown in the table. Determine the capacity of the elevated tanks required in the following cases:
 - 1- high lift pumps works with uniform rate for 24 h/d,
 - 2- high lift pumps works with uniform rate for 18 h/d.

Suggest other case to more minimize the capacity of the elevated tanks and calculate it. (6 marks)

Time	Rate (L/4hr)	Time	Rate (L/4hr)
12 M.N - 4 A.M 4 - 8	; 16 30	12N - 4 P.M 4 - 8	48 38
8 – 12 N	58	8 - 12 MN	10

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	I the empty space: (3)				
1. T	he water distribution net	twork modes are: 1	2	., 3, and 4	
	alue of the force acting o				
	he minimum inner heigh				
	ield pipe pressure test ru				
6. W	ater leak detection and i	repair programs sav	e	an a	
b) For	the following water dist	ribution network (C	Q = 85 L/sec	estimate the height of	
the c	elevated tank which will	be constructed at	point (A) to h	ave water pressure at	
	$t F = 2.5 \text{ kg/cm}^2$, conside				
	e discharge (Q) is increas				
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	В	(,) - 1			
A	D		D		
85	L/sec 500m, \$ 400 mm	400 m, \$300 mm	250 m,		
		As well have cover	\$300 mm	n.	
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				and a second control of the process of the second control of the s	
-Types -A late	orief notes on: of collection systems ral sewer and a main sewer	-Factors governing	the design of gr	avity sewers (6 marks)	
c) A circu					
	lar combined sewer is to ca	arry 0.35 m ³ /sec. Wh	en running 2/3	full at max. W.W.F. and 0.1	
				full at max. W.W.F. and 0.1	
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