Test Project

Task A5 – Process understanding by magnetic cards

Water Technology

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Introduction

Wastewater treatment is to remove as much the suspended solids and dissolved organics or inorganics as possible before it is discharged to environment in order to reduce its adverse impact to the environment. The objective of this task is to propose a wastewater treatment process using pictographs of magnetic cards according to the given instructions.

Description of project and tasks

A wastewater treatment plant receives wastewater from Settlement / Estate (or domestic), Trade (or commercial) and Industry with a population equivalent (PE) of 120,000. The plant is designed with an upstream denitrification process and consists of the following process unts.

1. Screw Pump.
2. Grit Chamber, 2 numbers of longitudinal grit chamber.
3. Screen.
4. Anaerobic Tank, 2 numbers with a volume of 2000 m^3 each.
5. Primary Settlement Tank, 2 numbers of rectangular tanks with a volume of 700 m^3 each.
6. Secondary Settlement Tank, 2 numbers of circular tanks with a volume of 850 m^3 each.
7. Nitrification tank.
8. Denitrification tank.
9. Recirculation Pump to circulate part of activated sludge to Denitrification unit.
10. Sludge return from Secondary Settlement Tank to Anaerobic Tank via Return Activated Sludge Pump.
11. Chemical dosing of carbon source via Precipitant Tank at secondary sludge line before Return Activated Sludge Pump.
12. Treated wastewater goes through 2 numbers of Filtration tanks before being discharged to the environment of Receiving Water.
13. The primary and excess sludge from the treatment processes combined and go for further sludge treatment process.

Instructions to the Competitor

You are required to create a process flow diagram with correct annotation and processes sequence for the wastewater treatment plant according to the Description of project and tasks.

1. Add in pipeline represented by continuous line or dash line and arrow to connect all process units in the following colour code.

- Wastewater in blue.
- Sludge in brown (if brown colour marker is not available, use red marker instead).
- Chemical dosing in brown colour dash line with arrow at end (if brown colour marker is not available, use red marker instead).

2. Add in Monitoring Device with black dash line for dissolved oxygen (DO) in Denitrification and Nitrification tank, and pH after the Secondary Settlement Tank.

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3. Write down all the information including population, volume of the tanks, and parameter measured by measuring device on the process diagram on white board.
4. Note:

- Draw out a box or rectangle with correct word description in it if any process unit does not have sufficient required number.
- Process unit with more than 1 tank are operated in parallel.

To continue.

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Tables, Graphs and Pictures

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Data and Report

Country Name: _____ **Competitor Name:** _____

Answer following questions.

1. What is recommended minimum flow velocity before the screen in wastewater treatment plant?

No	Flow velocity
A	2.4 cm/s
B	0.3 m/s
C	2.4 m/s
D	3 m/s

( )

2. Select the normal operating hydraulic retention time for primary settlement tank in biological wastewater treatment.

No	Hydraulic retention time for primary Settlement Tank
A	0.5 – 1.5 hours
B	6 – 8 hours
C	0.5 – 1.5 days
D	6 – 8 days

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3. What are the four phases of anaerobic sludge stabilisation?

No	Four phases
A	Ammonification, denitrification, digestion and nitrification phase
B	Hydrolysis, leaching, acetogenic and methanogenic phase
C	Hydrolysis, acidification, acetogenic and methanogenic phase
D	Sludge liquor separation, transition, thickening and dewatering phase

( )

4. What is normal maximum delivery head of screw pump at wastewater treatment plant?

No	Maximum delivery head
A	Up to 70m
B	Up to 7m
C	Up to 70 mm
D	Up to 0.7 m

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Table 2: Time Used for the Task.

TIME	TIME CHECK
End time (hh/mm)	
Duration (min)	
Checked by	Expert Signature / Name

Marking Scheme

The task evaluation will be made according to the Competition Information System (CIS) of Water Technology 2026.

End.

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