

ENVE 301 (2010-2011) TERM PROJECT-II

In the scope of this project, each group (consisting of 5- 6 people) will prepare the detailed design of the following units for the given influent characteristics.

Influent Characteristics:

Average flowrate	80000 m ³ /day
Turbidity	30 NTU
<i>pH</i>	7.5
Temperature	10 °C
Conductivity	490 (u.mhos)
Color	17 °H
Total hardness	168 mg/L CaCO ₃
Temporary hardness	104 mg/L CaCO ₃
Permanent hardness	64 mg/L CaCO ₃
Total alkalinity	104 mg/L CaCO ₃
Ca hardness	104 mg/L CaCO ₃
Mg hardness	64 mg/L CaCO ₃
Chloride	79 mg/L Cl ⁻
Tot. Fe	2.24 mg/L
Tot. organic matter	4.2 mg/L
Sulfate (SO ₄)	61 mg/L

Effluent Criteria:

The treated water will satisfy requirements of **TSE 266 (1997)**.

The design will include the detailed process calculations of the following units:

1. Rapid mixing unit (propeller or turbine mixer) + Slow mixing unit (paddle type) + rectangular sedimentation tank (**Due date: 03/01/2012**)

Water from slow mixing tanks will pass to sedimentation units through common wall(s) including orifices. The orifice wall design should also be done.

For each process unit, the following scaled Autocad drawings will be prepared:

1. Plan view
2. Cross-section
3. Longitudinal section

Each drawing will include a legend. The legend will consist of at least the followings:

- Drawing name
- Group name
- Scale of drawing

On each drawing, the dimensions will be shown in mm.

The layout of the proposed plant including cascade aeration, coagulation & flocculation units and sedimentation basins will be submitted

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TERM PROJECT-II

The spiral binded report will include the following sections:

- Cover Page
- Content page
- Executive summary
- Brief description of process
- Detailed process calculations
- Reference list (All references listed here will be referred in the report)
- Appendixes:

Source code of all computer programs to be used

Drawings (should be inserted in a clear file)

Layout of the proposed plant

Summary table given below

The below table should be filled by each group

COAGULATION

CHECK LIST	
Cover Page	
Content page	
Executive summary	
Brief description of process	
Reference list	
Appendixes: The source code of all computer programs to be used will be	
Drawings	
Plan View	
Cross Section	
Longitudinal Section	
Plant Layout	
Dimensions	
Number of tanks	
Tank shape	
Diameter of each tank, m	
Length of each tank, m	
Width of each tank, m	
Depth of each tank, m	
Volume of each tank, m ³	
Design Parameters	
Reynolds Number	
Power(W)	
G (sec ⁻¹)	
t _R (sec)	
Rotational speed of shaft(rpm)	
Impeller Diameter(m)	
Mixer Type(turbine-propeller etc)	
Blade length(m)	
Blade width(m)	
Baffle width(m)	

FLOCCULATION

CHECK LIST	
Dimensions	
	Number of tanks
	Number of compartment
	Length of each compartment, m
	Width of each compartment,m
	Depth of each compartment,m
	Volume of each compartment, m ³
	Total tank volume,m ³
Rotational speed of shaft(rpm)	
	Compartment 1
	Compartment 2
	Compartment 3
G (sec-1)	
	Compartment 1
	Compartment 2
	Compartment 3
GT	
tR(sec)	
Blade dimensions	
	Number of paddle wheels per shaft
	Number of blades per paddle
	Ratio of(blade speed rel.to water/blade tip speed)
	Length of blade(m)
	Width of Blade
	Total paddle area/ Tot area
	Space btw each paddle
Distances between each blade pairs, m	
	D1
	D2
	D3
	L/W ratio
	CD
Peripheral tip velocity of each blade pair, m/sec	
	Compartment 1
	Compartment 2
	Compartment 3
Vel. of each blade pair rel. to water, m/sec	
	Compartment 1
	Compartment 2
	Compartment 3

ALUM-POLYMER-SLUDGE

CHECK LIST	
Coagulant and sludge calculations	
Coagulant type(alum, FeCl ₃ etc)	
Coagulant dosage(mg/L)	
Purity of coagulant, %	
Alum requirement (kg/d)	
Alkalinity needed (mg/l CaCO ₃)	
Polymer dosage(mg/L)	
Purity of polymer, %	
Polymer requirement (kg/d)	
Solid Production (kg/d)	
SS (kg/d)	
Others (poly. activated carbon etc)(kg/d)	
% solids in sludge	
Sludge pump capacity (m³/d)	

SEDIMENTATION

CHECK LIST	
Cover Page	
Content page	
Executive summary	
Brief description of process	
Reference list	
Appendixes: The source code of all computer programs to be used will be given as an appendix	
Drawings	
Plan View	
Cross Section	
Longitudinal Section	
Plant Layout	
Dimensions	
Number of tanks	
Tank shape	
Diameter of each tank, m	
Length of each tank, m	
Width of each tank, m	
Side wall depth, m	
Volume of each tank(m ³)	
Width of effluent launder(m)	
Design Parameters	
Surface Loading (m ³ /m ² .d)	
weir loading(m ³ /m.day)	
reynolds number	
froude number	
horizontal velocity(m/min)	
bottom slope	
Tr(hr)	
circular tank	
Central feed well diameter, m	
Depth,m	
travelling bridge type (half, full, 2/3)	

