MASTER OF CIVIL ENGINEERING EXAMINATION, 2018
1st year , 2nd Semester

SUBJECT: INDUSTRIAL WASTEWATER TREATMENT

Time: ~~Two hours~~/Three hours/~~Four hours/ Six hours~~　　　　Full Marks ~~30~~/100

Use a separate Answer-Script for each part

No. of Questions	Part I (Marks:50)	Marks
	Answer all the questions Assume relevant data if necessary	
Q1.(i)	Explain briefly the sources of following heavy metals commonly found in trade effluent. (A) Chromium (B) Nickel (C) Zinc Discuss their solubility condition with respect to pH as occurrence of minimal concentration. What are the effects of above pollutant on human health?	6
(ii)	Discuss the removal technology of metal pollution by different precipitation methods.	6
(iii)	A pressurized recycled flow floatation system is to be installed for 90% removal of suspended solids from the waste originating in a fruit processing unit. Determine the size of floatation unit from the following :- a) Solids in influent waste - 400 mg/l b) Optimum A/S ratio – 0.06 c) Air solubility at 30^0C-7.8 mg/l d) Wastewater flow rate – 75m³ /hour e) Recycle pressure – 3.0 atm f) Surface loading rate – 85 l/m²′/min g) " f" value 0.60 Assume any data if required.	7
(iv)	An industrial unit emanates wastewater with a total flow of 1000m³ /day. Design an equalization tank on the basis of following data. a) Data collection interval-4hrs b) Average BOD- 570mg/l c) Maximum BOD -925 MG/L d) Effluent BOD must not exceed from equalization tank -780 mg/l e) 84% probability of BOD≤ 850mg/l f) 16% probability of BOD≤375 mg/l g) 50% probability of BOD≤ 570mg/l h) Depth of the tank - 4.5 m i) Z= 1.65	6

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No. of Questions	Part I (Marks:50)	Marks
Q 2.		
(i)	Discuss the importance of material and water balance diagram for assessment of industrial wastewater treatment. What are the different streams to be considered for the above?	(4+3)
(ii)	What is the necessity of providing an equalization tank? Does the basin can serve as neutralization tank? Justify your answer.	3
(iii)	A bean blanching processing industry discharges ammonical liquor with other organic pollutants. The flow rate was found to be 5 mld. The BOD_5 and TKN values after primary treatment are found to be 245 and 85mg/l respectively. A combined nitrification cum organic removal has been suggested for proper treatment of the same. The minimum sustainable temperature .DO, and pH are 15^0 c,2.1mg/l and 7.3 respectively. Following values are obtained from pilot plant studies. a) KO_2-1.27 b) K_{dN} -0.04 c) Safety factor -2.5 d) K_N—$10^{0.051T-1.158}$ e) μ=0.5/d f) MLVSS in the aeration tank=2500 mg/l g) Overall yield including nitrification=0.30 h) Activated sludge yield=0.60 i) K_d for carbon utilization=0.06 Determine the size of the aeration tank,HRT,theoretical volume of air needed for complete removal of organics and nitrification (95% efficiency) with 125% excess air supply.	15

Form A: Paper –Setting Blank   Ref No.: Ex/PG/CE/T/129E/2018

M.E. CIVIL ENGG. 1ST YEAR, 2ND SEMESTER EXAMINATION, 2018
(1st / 2nd Semester / ~~Repeat~~ / ~~Supplementary~~ / ~~Annual~~ /~~Biannual~~)
SUBJECT: INDUSTRIAL WASTEWATER TREATMENT
(Name in full)

Full Marks: 100
(50 marks for this part)

Time: ~~Two hours~~/Three hours/~~Four hours~~/ ~~Six hours~~

Use a separate answer-script for each part

No. of Question	Part-II	Marks
	Answer Question-1 and any *two* from the rest	
Q.1) a)	What do you mean by **"bleaching of pulp"**? What are the steps followed in the bleaching of pulp during the process of paper manufacturing?	(2+4)
b)	State the **pollution abatement measures** recommended for small scale bovine slaughter houses.	5
c)	How **"Recovery of Fat"** is carried out in modern dairy plants?	5
d)	Describe in brief the **"Sulphide treatment"** for demercurization of wastewater emanating from a **chlor-alkali industry**.	4
Q.2) a)	Describe with the help of neat flow diagram different processes involved in a typical **mercury cell chlor-alkali unit**.	7
b)	Describe with the help of pertinent reactions the purification of brine effected in a typical **mercury cell chlor-alkali unit**.	4
	Explain with the help of schematic diagram the process of **"demercurization of brine mud"**.	4
Q.3) a)	Draw a **neat process flow chart** for a market milk production unit.	5
b)	Discuss in brief on the following operations involved in market milk production. i) Pasteurization ii) Homogenization	(3+3)

Marginal notes (left side):

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Form A: Paper –Setting Blank

Ref No.: Ex/PG/CE/T/129E/2018

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Full Marks: 100
(50 marks for this part)

No. of Question	Part-II	Marks
c)	Discuss in brief on **different treatment alternatives** recommended by CPCB for modern dairy plants.	4
Q.4) a)	Discuss on the steps involved in **"Chemical Pulping"** process of pulp manufacturing?	5
b)	How **"Chemical Recovery"** is practised in a typical small scale pulp and paper mill?	5
c)	Draw a **neat process flow chart** for a typical **small-scale bovine slaughter house** and mark the potential points of effluent generation.	5