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Design of 50KLD Sewage Treatment Plant

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Abstract: ***Sewage treatment is a type of wastewater treatment which aims to remove contaminants from sewage to produce an effluent that is suitable for discharge to the surrounding environment or an intended reuse application, thereby preventing water pollution from raw sewage.***
Canteen of every academic organization need a lot of clean water, and it generates equivalent amount of wastewater every hour which is neither purified nor reused.
Due to water scarcity, the recycling and reusing of wastewater become very essential. The present study describes the simple and Cost-effective method for the design of a smallscale wastewater treatment plant for the purification of wastewater generated by canteen of Ma'din College.
The present study involves the Analysis of pH value, total solid , total Suspension solid , hardness,Acidity , oil fat and grease , chloride ,BOD,DO etc. The Sampling of the waste water have been done in different times of the day to have an Average data of measure parameters.
Depending upon the values of these Parameters, calculation are done for designing the different units Of a 50KLD Sewage treatment plant and preliminary layout is prepared for the same.
Keywords: MBBR Plant, Activated Sludge, Settled Sludge

I. INTRODUCTION

Pollution in its broadest sense includes all changes that curtail natural Utility and exert deleterious effect on life. The crisis triggered by the rapidly growing population and industrialization with the resultant degradation of the environment causes a grave threat to the quality of life. Degradation of water quality is the unfavorable alteration of the physical, Chemical and biological properties of water that prevents domestic, Commercial, industrial, agricultural, recreational and other beneficial uses Of water. Sewage and sewage effluents are the major sources of water pollution. Sewage is mainly composed of human fecal material, domestic wastes including wash-water and industrial wastes. The growing environmental pollution needs for decontaminating waste water result in the study of characterization of waste water, especially domestic sewage. In the past, domestic waste water treatment was mainly confined to organic carbon removal. Recently, increasing pollution in the waste water leads to developing and implementing new treatment techniques to control nitrogen and other priority pollutants. Sewage Treatment Plant is a facility designed to receive the waste from domestic, commercial and industrial sources and to remove materials that damage water quality and compromise public health and safety when discharged into water receiving systems. It includes physical, chemical, and biological processes to remove various contaminants depending on its Constituents. Using advanced technology it is now possible to re-use of sewage effluent for drinking water. The present study comprises the study on quality of waste water that is discharged from the Canteen of Ma'din polytechnic college Malappuram. The study includes characterization tests for pH value, acidity, alkalinity, chloride, residual chlorine, turbidity & DO.

II. LITERATURE REVIEW

A. M Aswathy et.al (2017)

Studied on analysis and design of sewage treatment plant of apartment in Chennai. This project is studied that domestic and commercial waste and removes the material with Possess harm from generated public. To produce an environmental sewage fluid waste stream and solid Waste suitable from disposal of use.

B. Chakar Bhushan et al. (2017)

Reviewed about design of sewage treatment plant for Lohegaon village, Pune. This project studied that social and environmental pollution issue due to sewage is disposed in some Part of village and directly sewage drain in open land. It is used for recharging sub surface water level at Lohegaon and used for irrigation purpose.

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C. Pushpalatha et.al(2016)

Reviewed on design approach for sewage treatment plant

The present study involves the analysis of parameters like BOD, raw sewage, effluent. The construction of sewage treatment plant will prevent the direct disposal of sewage in nagavali river and the use of treated water will reduce the surface water and contaminated ground water.

D. Pramod sambhaji patil et.al. (2016)

Studied on design of sewage treatment plant for Dhule city. Some treatment units are designed like screens, grit chamber, storage tank, settling tank, aeration tank and skimming tank. The effluent can also be used for artificial recharge of ground water, flushing, foam control, fire protection, lawn sprinkling

E. S. Ramya et al. (2015)

Reviewed on design of sewage treatment plant and characteristics of sewage. The growing environmental pollution need for decontaminating water results in the study of characterization of waste water especially domestic sewage.The waste water leads to developing and implementing new treatment techniques to control nitrogen and other priority pollutants.

F. Murthy polasa et.al (2014)

Reviewed about design of sewage treatment plant for gated community.In this Project three types of treatment unit operations are conducted. Like physical, chemical and biological Processes. By increasing the detention time of sewage in each treatment unit increases the efficiency of Removal unwanted impurities

G. Subbaramaiah and Mall (2012)

This study show Use Based on the experimental results obtained Sequencing batch reactor (SBR) was an attractive alternative to conventional biological wastewater Treatment systems, optimum value of MLSS concentration to be maintained in the reactor is found to be5000 mg/l. treatability of SBR for BA is good for higher concentrations (< 200 mg/l), and also removal Percentage was Increases with increase in initial concentration. The optimum value of temperature was Found at 30oC. The optimum value of aeration time during fill phase is found to be 3 h, at full aeration Rate of removal is rapidly increasing compare with anoxic condition in fill phase.

H. Arrojo et.al (2005)

Gave a study on SBR process, in SBR process with help membrane process completely removes coliform bacteria and suspended solids, thus providing a higher quality effluent with respect to conventional processes. After SBR treatment neither found faecalcoliforms nor E. coli were found in permeate. The removal efficiency of both bacteria and suspended solids by membrane filtration was 100%, suggesting that the experimented compact system

III. DETAILS OF TREATMENT PLANT

A. Design of Bar Screen

•Max Flow = 45 KLD

•Detension Time = 6min •Screen made out of Ms flat of size10mm x 50mm .

•BSC Size= 0.7m x0.7m x 0.4m

•Bar Screen chamber size = 1m x 1m x 1.5m

B. Design of Grit Chamber

• Max flow =$1.3x10^3$ m^3 /sec

•volume of grit chamber = 0.234 m^2

•provide 25 % additional length to accomodate inlet and outlet zone

•Dimensions are kept as =3.6mx1m x0.5m

C. Design of Flocculator

•Inlet flow = 0.08 m^3 / min •Area of flocculator = 1.2m^2 •power for slow mixing agitator = μ x r^2 x vol. of tank = 3.4 watt
•Diameter of Flocculator = 0 · 5 M
•2 paddies of height 0.5m and width 0.2m

D. Primary Sedimentation Tank

•Detension time = 2hr •Quantity of water to be treated =3.75m^3
•Dimensions are kept as =2.5mx1.5m x1.5m
Aeration tank
•Bod in Sewage = 200mg/L
•Bod in (load per day) =9kg/day
•Flm ratio = 0.12
•Take ML Biomass = 110kg •Aeration table volume = 31.43 m^3
•Avg retension time = 17 hrs .

E. MBBR with bio Media

• Inlet BOD = 200mg/L
• Outlet BOD= 5mg/L
• BOD loading =9750 g/day.
•Effective surface area of carrier element is 500 m^2/m^3 (considering biomedia type K3)
•Dimensions are kept as=2mx2m x 0.5 + 0.2m (free board)
•Residual Do in aeration tank = 1.5 mg/L.
•Oxygen in aeration tank=3 gm
• Air needed in hours = 2.25 m^3/hr
• provide 2 blowers with 1 stand by

F. Design of Secondary Clarifier

• Design over Flow rate =16 m^3/m^2 /day
•Solid loading rate =2 kg/m^2/hr
•weir loading rate = 11.25 m^2/RM/day
•Hydraulic detention time = 4hr
•Dimensions are kept as = 2mx2mx2m+(0.3)FB

G. Design of chlorination Chamber

•Detention time=30min
•Dimensions are kept as 1m x 1m x 0.25m+(0.1)FB

H. Design Sludge Digestion Tank

•Total suspended solid = 400 mg/L .
•Detention period =30 days . •Capacity of digestion tank= 2.78 m^3
•Dimensions are kept as 2m dia cylindrical tank with 1m depth and an additional 1 : 1 slope for collection of digested Sludge.

IV. CONCLUSION

The potential reuse of the treated can be done in effective and innovative ways because the final results will be of very good quality which lies under the PCB norms which are very good for reuse in irrigation gardening , and washing of automobiles available in the campus of Ma'din polytechnic college Malappuram. To maximize the output we need to make full use of the system so we need to make the use of biogas generation from the SLUDGE DRYING BED , " GENBACHER GAS ENGINES - TYPE 3 " can be used in the STP To generate electricity and reduce the power cost of the STP . To reduce the foul smell from the entire STP we need to spray the " GOLDEN DECOMPOSER " .

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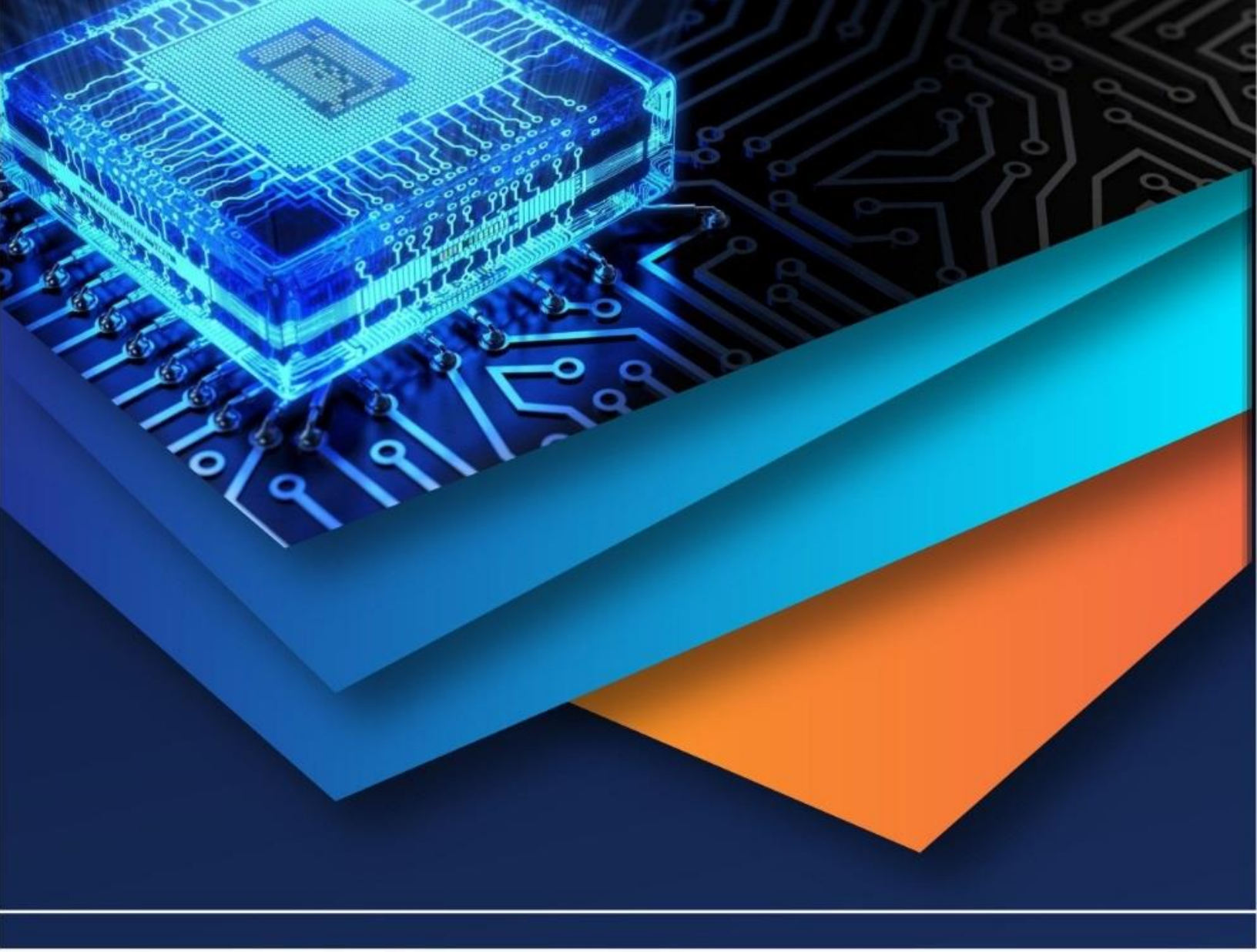
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