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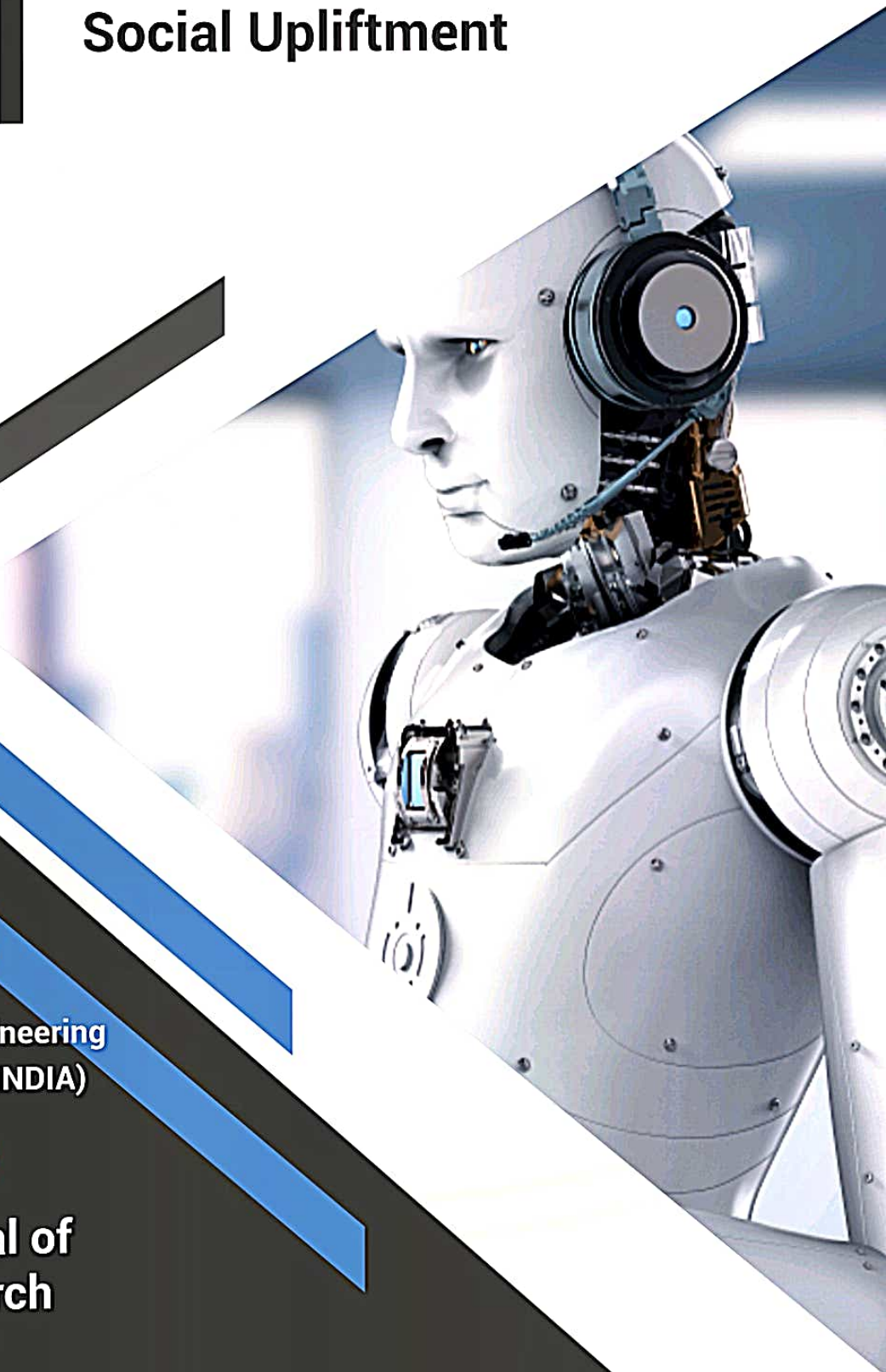
National Conference on
Technical Advancements for
Social Upliftment

Organized by

Vidyavardhini's College of Engineering
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Published By



International Journal of
Engineering Research
and Technology
(www.ijert.org)



NTASU - 2020 (VOLUME 09 - ISSUE 03)

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 DOI : 10.17577/IJERTCONV9IS03042[DOWNLOAD FULL-TEXT PDF](#)[CITE THIS PUBLICATION](#)

- Open Access 
- Article Download / Views: 250
- Authors : Puja Kadam
- Paper ID : IJERTCONV9IS03042
- Volume & Issue : NTASU – 2020 (Volume 09 – Issue 03)
- Published (First Online): 13-02-2021
- ISSN (Online) : 2278-0181
- Publisher Name : IJERT
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 PDF Version **Text Only Version**

Determination of Efficiency of Roughing Filter for Grey Water Treatment

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Abstract India is facing a serious water crisis and it is estimated that India's population will be suffering from severe water scarcity by 2025. Groundwater and surface water sources are becoming increasingly vulnerable to anthropogenic pollution. The best cost-effective process to reduce water scarcity is the reuse of grey water. The total grey water fraction has been estimated to account for about 75% volume of the combined residential sewage. Grey water typically breaks down faster than black water and has lower levels of nitrogen and phosphorus. Hence Grey water management aims on using treated grey water in applications which do not require drinking water quality. These non potable reuse applications include industrial processes, irrigation, toilet flushing and laundry washing depending on the technologies utilized in the treatment process. Hence the need for a separate treatment system right on the premises of the house or an apartment block or hotel, from which the water comes, and where the treated water would then be used would be the sensible solution to combat water crisis. In this paper, the design of laboratory scale roughing filter using different filter media to treat grey water generated is presented. The performance of laboratory scale grey water treatment was investigated using roughing filters and the efficiency was analyzed.

Keywords Grey water, Roughing Filter, filter media, water crisis.

1. INTRODUCTION

Where there is water, there is life. Life exists around numerous uses of water which makes it important for survival and luxury. It is an essential resource to sustain life. A lack of water to meet daily needs is a reality today for one in three people around the world. Because of this, water should be conserved to sustain our domestic needs for the future. As world population is constantly growing, the demand of water increases each and every day. According to experts, conservation is one way of making use of the available water in an effective and efficient manner. Nowadays, technology has developed to the point that waste water can be cleaned into water fit for irrigating, laundry and safe for drinking. One such way to treating waste water is Grey Water Treatment. Grey water is

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NTASU6021 Determination of Efficiency of Roughing Filter for Grey Water Treatment

in the Vidyavardhini's National conference 2020 **"Technical Advancements for
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Keywords—Grey water, Roughing Filter, filter media, water crisis.

I. INTRODUCTION

Where there is water, there is life. Life exists around numerous uses of water which makes it important for survival and luxury. It is an essential resource to sustain life. A lack of water to meet daily needs is a reality today for one in three people around the world. Because of this, water should be conserved to sustain our domestic needs for the future. As world population is constantly growing, the demand of water increases each and every day. According to experts, conservation is one way of making use of the available water in an effective and efficient manner. Nowadays, technology has developed to the point that waste water can be cleaned into water fit for irrigating, laundry and safe for drinking. One such way to treating waste water is "Grey Water Treatment". Grey water is slowly gaining importance in the management of water resources. The benefits of well-organized grey water management is that it offers a tool for coping with water scarcity and reduces the amount of pollution to enter the hydrological cycle.

A. Grey Water

Grey water is defined as wastewater without any input from toilets which means that it corresponds to wastewater produced in bathtubs, showers, handbasins, laundry machines

and kitchen sinks. It contains far less nitrogen than black water. Nine-tenths of the nitrogen contained in combined wastewater derives from toilet wastes. Grey water typically breaks down faster than black water and has lower levels of nitrogen and phosphorous. It decomposes much faster than black water.

B. Objective of Project

The objective of the project is to analyse the performance of the roughing filter and to determine its efficiency in treating grey water. This project has been aimed to reuse the grey water in an effective way for our domestic purposes according to the characteristics of grey water and feasibility of the adopted filter, so that the amount of water that is left unused is collected and treated for the purposes like gardening, cleaning, and laundry purposes. This can minimize the usage of water consumption for various domestic activities.

II. METHODOLOGY

A. Grey water Treatment

The increasing need for water paved way for the newest simpler treatment. It is a multistage process Grey water treatment is a process in which the solids, organic matter, hardness is removed. The treatment process is classified as:

- Preliminary Treatment

Preliminary Treatment was carried out to separate the large size floating particles like vegetable matters, food particles, leaves, hairs etc and also settleable inorganic solids

- Filtration Process

The filter used in this study is Roughing Filter. Roughing Filtration can be considered as a major pre-treatment process for wastewater, since they efficiently separate fine solid particles over prolonged periods without addition of chemicals. They mainly act as physical filters and reduce the solid mass. However, the large surface area large filter surface area available for sedimentation and relatively small filtration rates also supports absorption as well as chemical and biological processes. Therefore besides solid matter separation, roughing filters also partly improve the bacteriological water quality and to a minor extent, change some other water quality parameters such as colour or amount of dissolved organic matter.

B. Assembly and Testing of the Treatment System

The aim of the testing was to see that the treatment system is operating without any difficulties when water is pump into the system. For this the roughing filter was fabricated as per the design considerations of 5 person equivalent and it was tested for leakage before filling the