NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY
[IJIERT] ISSN: 2394-3696 Website: ijiert.org
VOLUME 8, ISSUE 7, July. -2021

ROTATING SPEED BREAKER SURFACE AERATOR SEWAGE SYSTEM

Vivek Bhaskar Ghorpade
Civil Engineering Dep. Savitribai Phule Pune University, Pravara Rural Engineering College Loni, Tal:Rahata Dist:Ahmednagar, Maharashtra, India.

Nikhil Vijay Shelke
Civil Engineering Dep. Savitribai Phule Pune University, Pravara Rural Engineering College Loni Tal:Rahata Dist:Ahmednagar, Maharashtra, India.

Shadab Aslam Patel
Civil Engineering Dep. Savitribai Phule Pune University, Pravara Rural Engineering College Loni, Tal:Rahata Dist:Ahmednagar, Maharashtra, India.

Sufiyan Fiyaj Shaikh
Civil EngineeringDep, Savitribai Phule Pune University, Pravara Rural Engineering College Loni Tal:Rahata Dist:Ahmednagar, Maharashtra, India.

Vikas Baburao Ghoderao
Mechanical Engineering Dep. Savitribai Phule Pune University, Pravara Rural Engineering College Loni Tal:Rahata Dist:Ahmednagar, Maharashtra, India.

Prof. Gayatri Rajendra Darandale
Civil Engineering Dep. Savitribai Phule Pune University, Pravara Rural Engineering College Loni Tal:Rahata Dist:Ahmednagar, Maharashtra, India.

ABSTRACT
In this project we are trying to utilize one transport medium that is road speed breaker. Aeration of sewage in sewer pipeline's/ channel's carried out by replacing the traditional speed breakers with some simple mechanism. The present invention relates generally to mechanisms for infusing air from the atmosphere into Sewage network pipelines. In this project we are trying to utilize friction between tires and road pavement. As vehicles pass over the speed breakers, they rotates the rollers/rotar (hump of speed breaker) which are connected to a gear mechanism which further connected into sewer pipeline ,In this unit the paddles are connected which drains out the sewage. This method is an effective way to drained out the sewage in very less time as the numbers of vehicles on the road are ever increasing. Also the cost of fabrication of the model is low. It can be effectively placed near high volume traffic flow. This method provides an efficient way to clean the sewage by aeration process from the channel in very less time and having large discharge as compare to existing one from the kinetic energy of moving vehicles on roads.

Keywords: Aeration, Frictional Energy, Rotating Speed breaker, Low cost fabrication, High Discharge, DO increase

INTRODUCTION
The primitive method of collecting and disposing of the society's wastes has now been modernized and replaced by a system in which these wastes are mixed with sufficient quantity of water and carried through closed conduits under the conditions of gravity flow. This mixture of water and waste products, popularly called sewage, thus automatically flows up to a place, from where it is disposed of after giving it suitable treatments, thus avoiding the carriage of wastes on heads or carts. Object of the present invention to provide an enclosed chain drive and speed reduction mechanism for interposition between the rotating speed breaker to a paddlewheel aerator and the paddlewheel main shaft, which enclosure is provided with

substantially into pipeline, and wherein the chain drive mechanism includes two or more stages providing at least about twenty to one shaft speed reduction between the rotating speed breaker and the paddlewheel rotor shaft. It is yet another object of the present invention to provide a paddlewheel aerator drive mechanism having two belt drive and associated sprockets together with an intermediate shaft for a large and small sprocket mounted substantially parallel to the shafts for the rotating speed breaker and the paddle wheel rotor.

As a result, the structure of the present invention provides a paddle wheel aerator drive with a mechanism which is very rugged and durable and capable of long continuous operation under adverse conditions without maintenance or repair. In monsoon season the percentage of precipitation increases and thus the channel gets over flooded, so we come up with idea of rotating speed breaker surface aerator sewage system in which the speed breaker rotates when the vehicle pass over the speed breaker and the kinetic energy get passed to the rotating paddle which drained out the channel in very fast manner in result the channel flow of discharge increases and the sewage drained as much faster than the previous existing one and thus the sewage system works in proper manner in any situations.

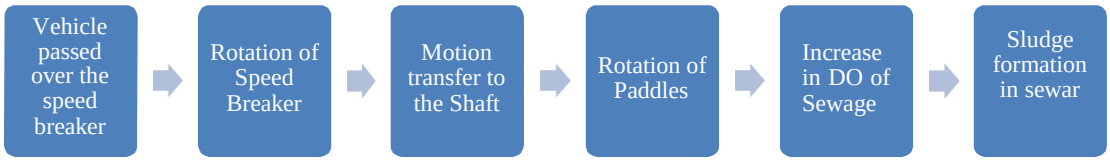
LITRATUREREVIEW

a) In the research paper of Rotating Speed Breaker Surface Aerator Sewage System as an Surface aerator in sewer lines.
b) In this experiment as the rotation of speed breaker increase the dissolves oxygen demand also increase which results in decomposition of organic material in the sewers at faster rate.
c) Previously only few of the research were made on this solution so we have use this rotating speed breaker and paddle as surface aerator.
d) The use of transportation medium i.e road speed breaker for the process of surface aerator.

PROCEDURE

To overcome the problem in channel blocking and to increase the life spans of sewage system by processing the surface aeration in the channel . Basically our normal sewage pipe lines are laid at certain slope. But during the monsoon season the discharge/flow get maximum, this surface aerator consist of paddles , inserted into the sewage line. This paddles are connected to shaft of rotating speed breaker. As long as vehicle wheel pass over it, it will rotate speed breaker and paddle too. Project is eco-friendly & no external energy source required.

Flow Chart of Working



Flow Chart of Working

When car reaches on speed breaker, due to rotational motion of tires of vehicle the speed breaker rotates in opposite direction of tires rotation. Due to the rotation of speed breaker the inner shaft is rotate and at one end , There is attached a sprocket and chain drive mechanism for transferring speed breaker rotational motion trough shafts and used in paddles rotation.

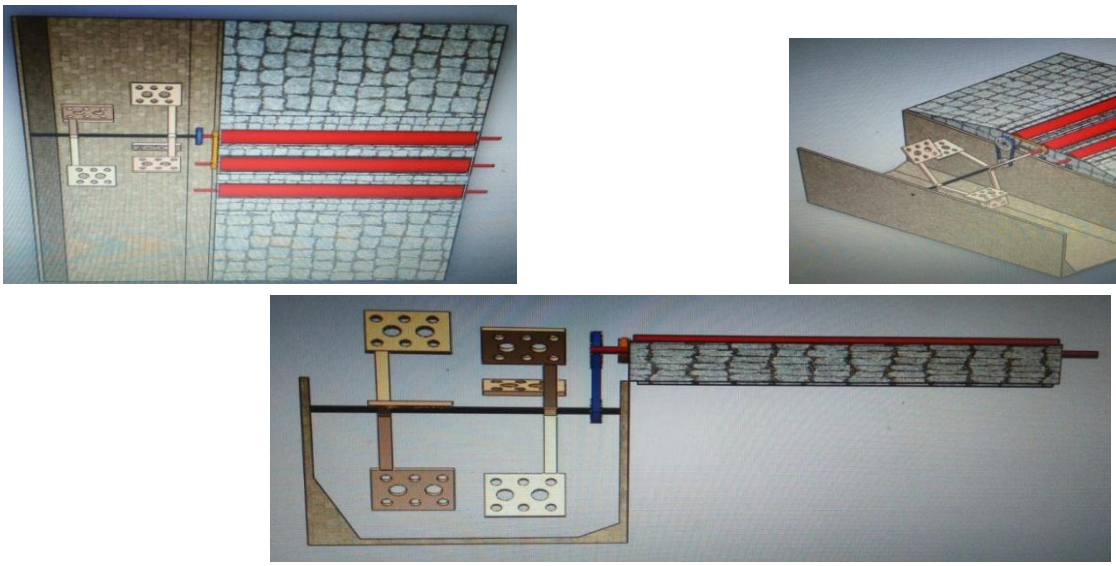
Procedures of the project work

1. Calculated the Number of vehicle passing through the region.
2. The speed breaker rotates when the vehicle run over the speed breaker
3. The rotation of the speed breaker is in the kinetic energy which results in the rotation of paddle.
4. When paddle moves , the rotating motion drained out the channel in fast manner ,which resulting the channel discharge increases and the sewage drained as faster rate than the previous existing one.
5. The amount of sewage discharge rate is calculated with our system.

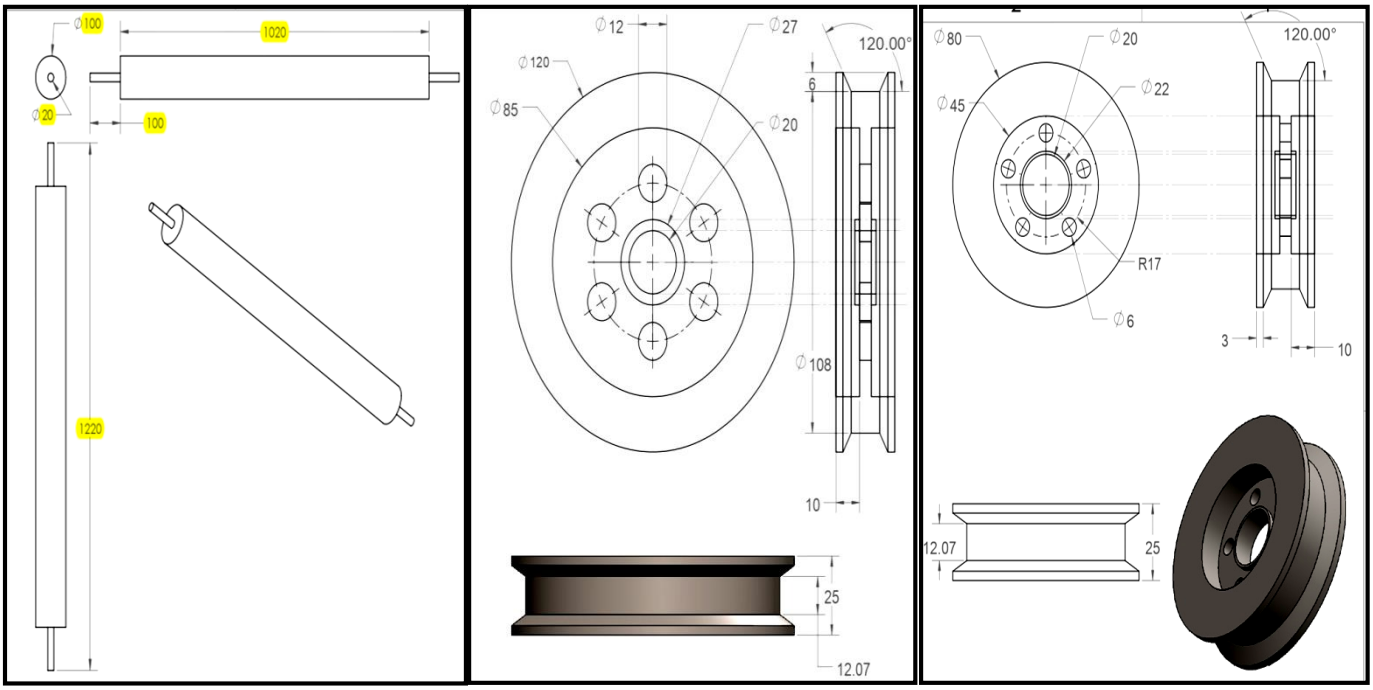
6. By this process the BOD & COD of sewage decrease
7. Resulting increase in DO level forms flocks which are the settle in STP

Explanation of Working model of Project

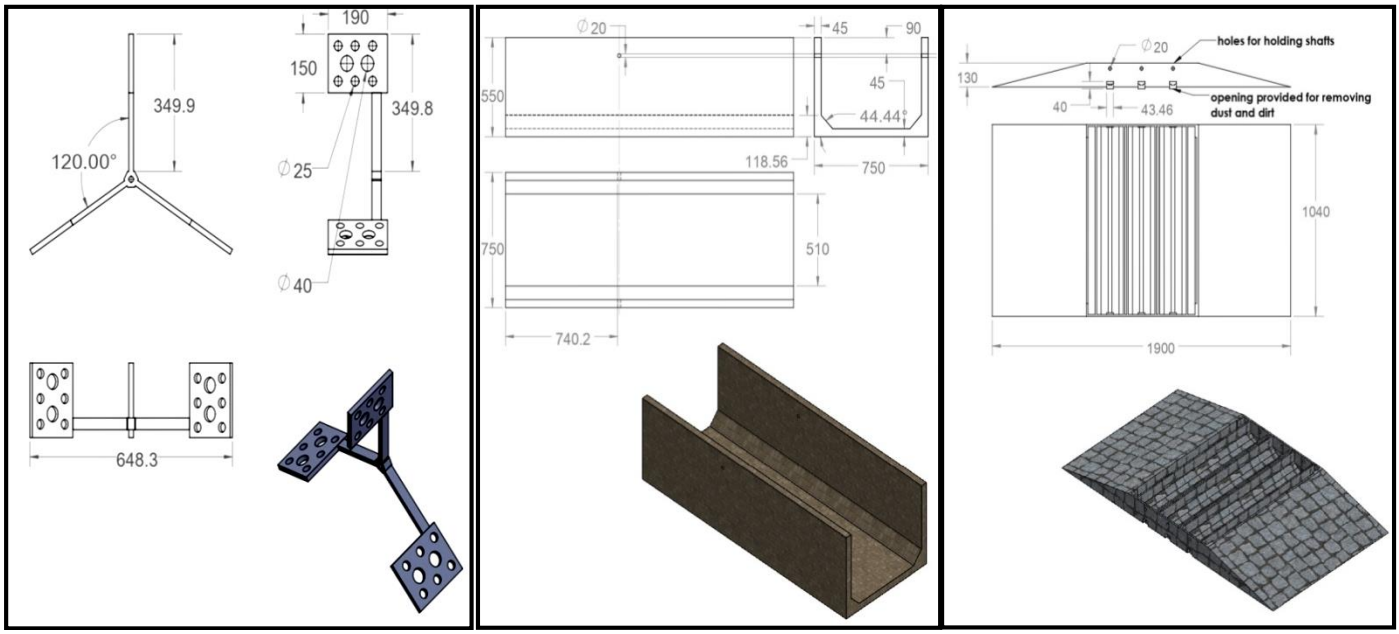
In our design we placed three consecutive speed breakers for getting effective rotation. Inside the rotating speed breakers, we fitted shaft for each to transfer the relative motion and also for smooth impact free rotations, and all three shafts are fitted in casing with bearings and those bearing are located in hubs for securing that they will not fall from their decided position. Here, first speed breaker placed for only reducing the speed of the vehicle for not take mischance or large impact force on casing and other parts of the speed breakers.



3D - Design model of the project



2D - Design model of the project



2D - Design model of the project

When a car reaches on 1st speed breaker, speed breaker starts rotating in opposite direction of the rotation of vehicle's tires. First speed breaker reduces the speed of the vehicle and starts rotating in opposite direction. Then, tires reached to 2nd speed breaker, the shaft of this speed breaker attached a big sprocket having 40 teeth and connected to shaft of 3rd speed breaker small sprocket (A) having 20 teeth using roller chains. And 3rd speed breaker also consist of another large sprocket (B) having 51 teeth. At the final shaft having two sprockets are basically unidirectional (means only at one direction they both will rotate and back rotation is not allowed). Since, when tire rotate the 2nd speed breaker it will also the responsible for rotation of 3rd speed breaker.

As both speed breakers starts rotating leads to rotate shaft as well as sprockets with the help of chain mechanism. We know at final shaft there is large sprocket(B) is present, these sprocket is connected to a gear box having different types of gear meshing and fully dipped in lubricating oil sump below the final sprocket. And there are no chance of slipping of chain and sprocket mechanism due to perfect guides .Large sprocket is used as a driving sprocket for gear box at one end, at the other side of gear box called driven shaft consist a paddle wheel like structure. This paddle wheel starts rotating when 2nd shaft initialize the rotation of mechanism. We made a gear box of ratio is 1:3. By using this gear box when large sprocket completes one rotation then paddle completes 3 rotations. And this paddle is located in drainage above the lower surface of the sewer.

When this whole system runs and the paddles rotate then, paddles give its motion to the sewer water to enlarge the flow of water and continuous flow could be obtain. While rotating those paddles it will also helps to drained out obstruct things like plastic and all. Also when speed breaker rotates, the aerial oxygen mixed with the sewer water and helps to increase the BOD & COD of water (BOD: Biochemical Oxygen Demand). BOD is very help full for Microorganism to grow and decompose the organic material from dirty sewer water. From this Project we can reduce the human efforts for cleaning the drainage and saves the ample of money.

WORKING MECHANISM

The present invention relates generally to mechanisms for infusing air from the atmosphere into large bodies of water, and more particularly to such mechanisms which are powered by a rotary Speed breaker and are provided with a large rotating paddlewheel with its paddles extending below the water line thereby producing coarse sprays of large volumes of water which absorb air from the atmosphere before falling back into the

body of water. In some case, such paddle wheel aerators are mounted on floats or rafts, and in other cases they are otherwise supported. Although paddlewheel aerator mechanisms are not complex, the demands on them are substantial as they are normally employed almost continuously and are subjected to environmental extremes of wind and weather. In addition, the rotating speed breaker and drive mechanism for such devices are exposed to some extent to the spray which it creates. A two (or more) stage chain drive reduction mechanism mounted in the box couples the motor shaft to drive the paddle wheel rotor at a fixed speed of rotation twenty to one hundred times less than the Speed breaker rotation.

As a result, the structure of the present invention provides a paddle wheel aerator drive with a mechanism which is very rugged and durable and capable of long continuous operation under adverse conditions without maintenance or repair.

One end of its shaft is secured in the Sewer pipe line channel of a substantially either open to air or close channel (In this case small air vane/window is provided to channel).Extending into the driver speed breakers assembly.

A Speed reduction chain drive inside the drive assembly couples the speed breaker shaft to the paddle shaft and includes at least two conventional drive chains, a small sprocket on the motor shaft, a large sprocket on the paddlewheel rotor shaft, and intermediate large and small sprockets on an intermediate shaft mounted in intermediate shaft bearings on an intermediate bearing take-up pedestal secured inside the chain drive box which has a removable cover.

The present invention relates to a water treating device having a water wheel arranged on upper side. Device can be used in treatment of not only industrial wastewaters but also sewage water exhausted from hospitals, offices, houses or the like. According to the feature, in the invention, the Consequently, the wastewater treating efficiency per unit is significantly improved and the water treating tank can be made compact. Oxygen transfer however is not only influenced by the size of the contact area, but also by the speed with which the contact area is renewed. The water at the boundary layer becomes saturated almost immediately after exposing to the air. However, in standstill water the diffusion of dissolved oxygen to deeper water layers goes very slowly. A fast and constant renewing of the contact area is required to get a high oxygen transfer. Oxygen deficit The oxygen deficit is the difference between the actual oxygen content and the oxygen saturation value of the water. The bigger the deficit is, the better the oxygen transfer will be. The maximum deficit is met when the actual oxygen content is zero.

CONCLUSIONS

Activated sludge can be formed and an effluent of desired quality can be obtained by thorough agitation of sewage. Under proper conditions the method of aeration is highly satisfactory. With efficient mechanical equipment and a sewage with a biochemical oxygen demand of less than 300 to 500 p.p.m. a rotation of the paddle is according to the veichle passes through that region that's easy to implement in metro city where maximum rotation daily can be attained. In cold climates the difficulties from ice forming on the paddles can be avoided by housing the upper or exposed portions of the paddles. Satisfactory aeration is obtained, by submerging the paddles from 6 to 9 inches in the mixed liquor. Greater submergence increases the rotation of the paddles, without materially improving the aeration. A lower submergence diminishes the effects of aeration. Conditions most suitable to the installation of this process include low cost of land, and difficult excavation or foundation conditions necessitating the use of shallow tanks. Under-aerated and bulking sludge, a low biochemical oxygen demand modulus, mechanical difficulties, and inefficient pumping equipment all point to the conclusion that the circulation of sewage through an aspirator by means of a pump which must lift the sewage into the aspirator head is not a successful method of sewage treatment.

Aeration of sewage through an aspirator is mechanically efficient and biologically and chemically satisfactory when the equipment is arranged with two or more aeration aspirators in series, with each rotation of paddles efficiency could probably be obtained by the use of a Perforated paddles which passing symmetrically through the center of the aspirator. It gives maximum efficiency in lager traffic area.

In cities like Bandara the vehicle travels 48000 per day, which includes 2/3/4/6/8 wheelers, the rotation we get much more significant compared to the experimental results obtained, thus making it a good impact on draining out the sewage from the vehicles which impact with the speed breakers is anyway lost. In this study

a new technique has been proposed to gate the rotational motion from speed breakers which utilized for the draining out the sewage in faster rate. This rotational energy can be tapped, stored and used as back up or for small applications by replacing paddles with generator. this technique will help to conserve our natural resources and give the healthy environment to all.

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to my supervisors Prof. G.R. Darandale and Prof. Y.D. Dhamak for providing their invaluable guidance, comments and suggestions throughout the course of the project. I would specially thank HOD Dr. P.K. Kolase for me to work harder and my friends who have supported in all the sections of my project work.

REFERENCES

1) GENERATION OF ELECTRICITY WITH THE USE OF SPEED BREAKERS, Piyush Bhagdikar, Shubham Gupta, Navneet Rana, R. Jegadeeshwaran, International Journal of Advances in Engineering & Technology, May, 2014. ISSN: 22311963,
2) FAILURE ANALYSIS OF AISI 304 STAINLESS STEEL SHAFT Fuller, R. W., Ehrgott Jr, J. Q., Heard, W. F., Robert, S. D., Stinson, R. D.,
3) Solanki, K., & Horstemeyer, M. F.,. Engineering Failure Analysis, 15(7), 2008, p 835-846 Article in Engineering Failure Analysis
4) EXPERIMENTAL STUDY OF MECHANICAL PROPERTIES OF AISI 1045, AISI 1053 AND AISI 4140 STEELS, Rajesh P Verma, Durgeshwar Singh, Shwetank Avikal International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-8 Issue-4S, April 2019
5) Mumbai after 26/7 Deluge: Issues and Concerns in Urban Planning, R. B. Bhagat, Mohua Guha Aparajita Chattopadhyay Popul Environ (2006) 27:337–349,DOI 10.1007/s11111-006-0028-z
6) The Mechanical Aeration of Sewage by Sheffield paddles and by an aspirator UNIVERSITY OF ILLIONS ENGINEERING EXPERIMENT STATION, Urbana Bulletin No. 268 July 1934, Harlod E. Babbitt Professor of Sanitary Engineering
7) Paddlewheel aerator drive mechanism, United State patent Barry L. House
8) Analysis of Speed Breaker Mechanism for More Effective Electricity Generation Md. Rokonuzzaman1 and Md. Hossam-E-Haider, Department of Electrical, Electronic and Communication Engineering, Military Institute of Science and Technology (MIST)
9) Simultaneous Determination of Chemical Oxygen Demand (COD) and Biological Oxygen Demand (BOD5) in Wastewater by Near-Infrared Spectrometry, Qiong YANG1, Zhenyao LIU1, Jidong YANG1, 2, School of Chemistry and Chemical Engineer Wing, Southwest China University, Chongqing, China
10) EVALUATION OF PADDLE WHEELS IN GENERATING HYDROELECTRIC POWER Yucheng Liu, Yoosef Peymani, University of Louisiana at Lafayette Department of Mechanical Engineering Lafayette, LA, 70503, USA

BIOGRAPHIES

	Name:- Vivek Bhaskar Ghorpade College Name :-At Pravara Rural Engineering College Loni. Quallfication:-Be Civil Mail Id:- vivekghorpade219@gmail.com
	Name:- Nikhil Vilas Shelke College Name :AT Pravara Rural Engineering College Loni. Quallification:-Be Civil Mail Id:- nikhilshelke1053@gmail.com
	Name :- Shadab Aslam Patel College Name :- Pravara Rural Engineering College , Loni Quallification:-Be civil Mail Id:- Patelshadab1999@gmail.com
	Name:- Sufiyan Fiyaj Shaikh College Name :- Pravara Rural Engineering College Loni. Quallification:-Be civil Mail Id:- patelsufil786@gmail.com
	Name:- Vikas Baburao Ghoderao College Name :- Pravara Rural Engineering College Loni. Quallification:- Be Mechanical Mail Id:- vikas.ghoderao1999@gmail.com
	Name :- Prof. Gayatri Rajendra Darandale College Name :- Pravara Rural Engineering College Loni Quallification:- M.E. (Environmental) Mail Id:- darandale@pravaraengg.org.in