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# Bore Well Water Sample Analysis in and around Railway Station Area of Aurangabad City, Maharashtra (India)

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**ABSTRACT:** The bore well water in the railway station area of Aurangabad has been studied extensively. The various parameters were monitored for the systematic study of water quality. The analysis of temperature shows that there is significant variation in temperature status. Temperature in the month of July was 26.7 and lowest temperature observed in the month of January was 20.1 mg/litre. pH in the month of December 8.2 which was relatively higher and lowest pH observed in the month of February which was 5.9 mg/litre. The analysis of Dissolved oxygen (DO) shows that there is significant variation. Dissolved oxygen in the month of May was 15.7, it was comparatively higher and lowest Dissolved oxygen observed in the month of August which was 10.7 mg/litre. Biochemical oxygen demand in the month of June was 14.6 which was comparatively higher and lowest Biochemical oxygen demand observed in the month of December which was 7.9 mg/litre. Chemical oxygen demand in the month of November was 9.7 which comparatively higher and lowest Chemical oxygen demand observed in the month of September i.e. 5.5 mg/litre. TDS in the month of November was 101 which was comparatively higher and lowest TDS observed in the month of September i.e. 65.7 mg/litre. Turbidity in the month of December was 4.9 it was comparatively higher and lowest Turbidity observed in the month of January i.e. 2.5 mg/litre. Chloride value in the month of April was 16.9 it was comparatively higher and lowest Chlorides observed in the month of December i.e. 10.7 mg/litre. Hardness in the month of December was 36.5 which was comparatively higher and lowest Hardness observed in the month of January i.e. 14.5. Calcium in the month of April was 25.8 which was comparatively higher and lowest Calcium observed in the month of December i.e. 19.9 mg/litre. The water quality parameters in the ground differ in area to area. Thus, the present research study was undertaken to distinguish the physiochemical nature of ground water samples in railway station area of Aurangabad city from different stations.

**KEYWORDS:** water, quality, bore well, variation, month, ground, area.

## I. INTRODUCTION

Water plays an essential role in human life. Although statistics, the WHO reports that approximately 36% of urban and 65% of rural Indian were without access to safe drinking water. Fresh water is one of the most important resources crucial for the survival of all the living beings. It is even more important for the human being as they depend upon it for food production, industrial and waste disposal, as well as cultural requirement. About 70% of the water in developing countries has become polluted due to the release of domestic sewage, industrial effluents and agricultural waste released into natural water source, such as rivers, streams as well as lakes [1]. About 95% of rural population living in India directly depends on ground water for domestic use [2]. The water quality characteristics is generally denoted by knowing the physical parameters like pH, TDS, TSS and chemical parameters such as total alkalinity, free CO<sub>2</sub>, DO, total hardness, Ca, Mg, salinity. According to World Health Organization (WHO) estimate about 80% of water pollution in developing country, like India is carried by domestic waste. Fresh water has become a main scarce commodity due to over exploitation and contamination of water. Increasing population and its demands have lead to the deterioration of surface and sub surface water. Groundwater is the major source of drinking water in both urban and rural regions. The importance of groundwater for the existence of human society generally cannot be overemphasized. Besides, it is crucial source of water for the agricultural and industrial sector. Groundwater crisis is not the outcome of natural factors. The high level of total hardness may be due to mixing of sewage effluents into the river. The permanent hardness is chiefly caused by chlorides and sulphates [3]. The permissible limit of alkalinity in the water sample is 600 mg/l (ISI) [4]. The total solids (TS) in the drinking water of study area studied scientifically [5]. It has been caused by human actions. Much of ill health which affects humanity, especially in the developing countries may be traced to lack

of safe and whole some water supply. The improper management of water systems may cause serious problems in availability and quality of water [6]. The quality of water is of vital concern for the mankind since it is directly linked with human welfare. It is a matter of history that facial pollution of drinking water caused water-borne diseases. In India 70% of the water is seriously polluted and 75% of illness and 80% of the child mortality is attributed to water pollution [7].The healthy nature of underground water has also altered at large scale [8].The industrial pollutants associated with organic matter, inorganic dissolved solids and other unwanted chemicals cause major ground water problems [9].During the past decade, widespread reports of ground water contamination have increased public concern about drinking water quality [10].The sewage water accumulated in the form of stagnant water and if there are any drinking water pipes nearby area, there is a chance for the intrusion of sewage water in the drinking water pipelines. To regulate the environment and shaping the land, water is one of the important compounds which influence the human life and even property. Primarily, mankind water is used for the domestic purposes such a drinking, cooking, washing. However the present uses of water may be classified as commercial, domestic, public and industrial. Due to the fast growth of industries, population and number of different chemicals, fertilizers and pesticides in producing crops are causing serious and rapid pollution in an aquatic environment leading to degradation of water condition and reduction of aquatic biota. Due to use of polluted water, human suffers from water borne diseases. It is need and obligation to control the water contaminants at regular interval of time. The water may consist of pollutants and toxic metals which are detrimental and damage the human health. The quality of ground water is the outcome of all the processes and reactions that act and condensed in the atmosphere to the time it is discharged by a well or spring and varies from place to place. Ground water is particularly important as it accounts for approximately 88% safe drinking water in rural areas, where population is widely dispersed and the infrastructure needed for treatment and transportation of surface water does not exist. Human and ecological use of ground water depends upon ambient water quality. Human alteration of the landscape has an extensive influence on watershed hydrology.

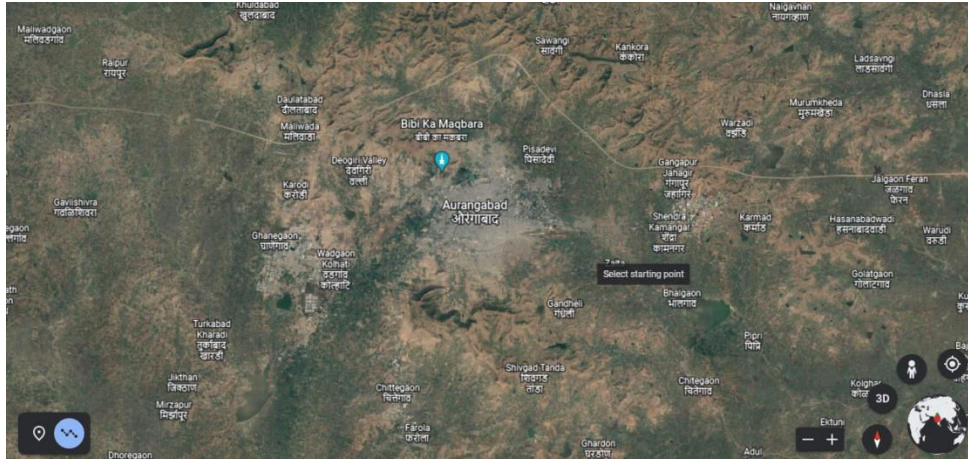
## II. RELATED WORK

Ground water plays a vital role in human usage. The consequences of urbanization and industrialization leads to spoiling the ground water is explored in rural especially in those areas where other sources of water like dam and river or a canal is not considerable. During last 10 years, it is observed that ground water polluted drastically because of increased artificial activities. Frequently in many cases of water borne diseases has been seen which a cause of health hazards. An understanding of water chemistry is the fundamental part of the multidimensional aspect of aquatic environmental chemistry which involves the source, composition, reactions and transportation of water in the nature.

## III. METHODOLOGY

Aurangabad city is one of the best industrial and fastest growing hub and which is known for its famous Industrial auto cluster. The average temperature of city observed in summer max 43°C and minimum 28°C and in winter temperature maximum 32°C to 5°C. The main sources of water include streams, percolation tanks and wells. Ground water plays a crucial role for irrigation as well as domestic utilization in city and district region. The Study area is located in between 74 to 76 degree east longitude and longitude 19 to 20 degree north [11].The systematic analysis of ground water samples were carried out to assess the physicochemical parameters. Domestic water samples were collected from Railway station area of Aurangabad city. The work was carried out continuously for twelve months i.e. January to December of 2021. Standard methods were adopted for the analysis of present research work as prescribed by APHA, 1989 [12]. Water has potential to dissolve organic and inorganic compounds in it; so water is called as universal solvent [13]. The value of pH was estimated at the time of sample collection at sampling locations by portable pH meter regulated by battery and by use of ready buffer solution to calibrate pH meter and remaining parameters were analyzed in the laboratory within the 24 hours to 8 days [14].





IV. EXPERIMENTAL RESULTS

Observed values have been tabulated in table no. 1 and graphically represented in Graph no. 1 to 10. The analysis of temperature shows that there is significant variation in temperature status. Temperature in the month of July was 26.7 and lowest temperature observed in the month of January was 20.1 mg/litre. The analysis of pH shows that there is significant variation in pH status. pH in the month of December 8.2 which was relatively higher and lowest pH observed in the month of February which was 5.9 mg/litre. The analysis of Dissolved oxygen (DO) shows that there is significant variation.

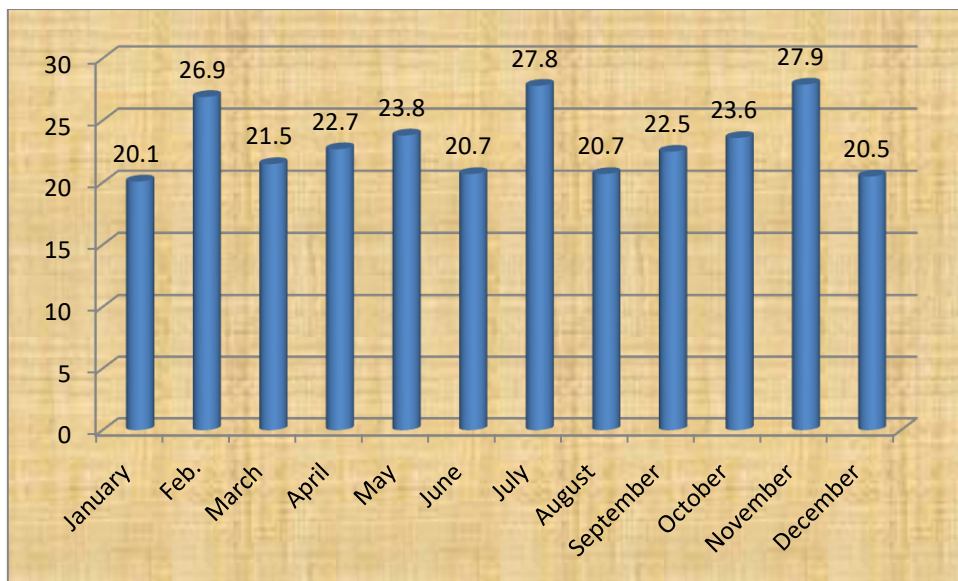
Table No. 1: Observed values of physico-chemical parameters (January to December 2021)

Months/ Parameter s	Janua ry	Fe b.	Mar ch	Apr il	Ma y	Jun e	Jul y	Augu st	Septe mber	Octob er	Novem ber	Decem ber	Avera ge e	Ma x.	Mi n.
Temperat ure	20.1	23. 5	21.5	22. 7	23. 8	25. 7	26. 7	24.8	22.5	23.6	25.7	24.5	23.23	26. 7	20. 1
pH	6.1	5.9	6.5	6.3	6.7	7.8	7.2	7.01	7.6	7.6	6.8	8.2	6.98	8.2	5.9
DO	12.7	12. 2	15.5	13. 8	15. 7	13. 2	11. 5	10.7	14.7	14.9	12.02	13.7	13.39	15. 7	10. 7
BOD	10.15	11. 5	12.8	10. 2	8.9	14. 6	12. 9	10.7	9.8	8.3	8.8	7.9	10.55	14. 6	7.9
COD	6.6	8.2	7.1	6.5	8.1	6.5	5.6	6.5	5.5	6.8	9.7	8.09	7.1	9.7	5.5
TDS	78.8	88. 7	85.7	79. 3	88. 7	90. 4	95. 8	98.7	65.7	97.5	101	88.96	88.27	101	65. 7
Turbidity	2.5	2.9	3.7	4.1	3.5	4.0	2.9	3.8	3.7	2.9	4.2	4.9	3.59	4.9	2.5
Chlorides	11.11	15. 5	14.8	16. 9	16. 7	12. 2	12. 2	16.8	15.7	14.9	15.2	10.7	14.39	16. 9	10. 7
Hardness	14.5	16. 8	16.1	22. 5	32. 5	22. 7	28. 9	32.7	36.5	20.1	16.5	15.5	22.94	36. 5	14. 5
Calcium	19.9	24. 7	22.5	22. 7	25. 8	23. 7	24. 9	23.7	20.9	25.5	21.6	25.5	23.45	25. 8	19. 9

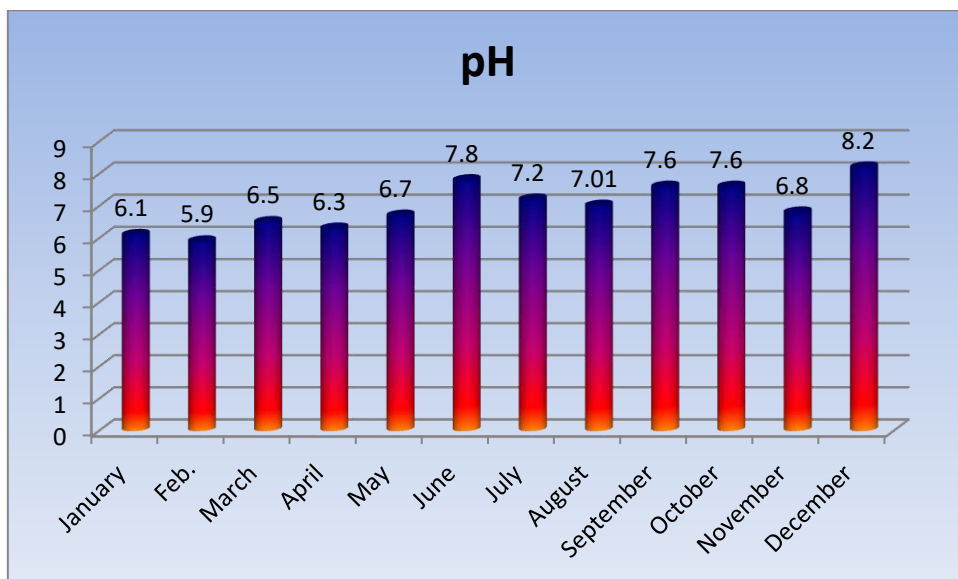
Dissolved oxygen in the month of May was 15.7, it was comparatively higher and lowest Dissolved oxygen observed in the month of August which was 10.7 mg/litre. The analysis of Biochemical oxygen demand (BOD) shows variation. Biochemical oxygen demand in the month of June was 14.6 which was comparatively higher and lowest Biochemical oxygen demand observed in the month of December which was 7.9 mg/litre. The analysis of Chemical oxygen demand (COD) shows variation. Chemical oxygen demand in the month of November was 9.7 which were comparatively higher and lowest Chemical oxygen demand observed in the month of September i.e. 5.5 mg/litre. The



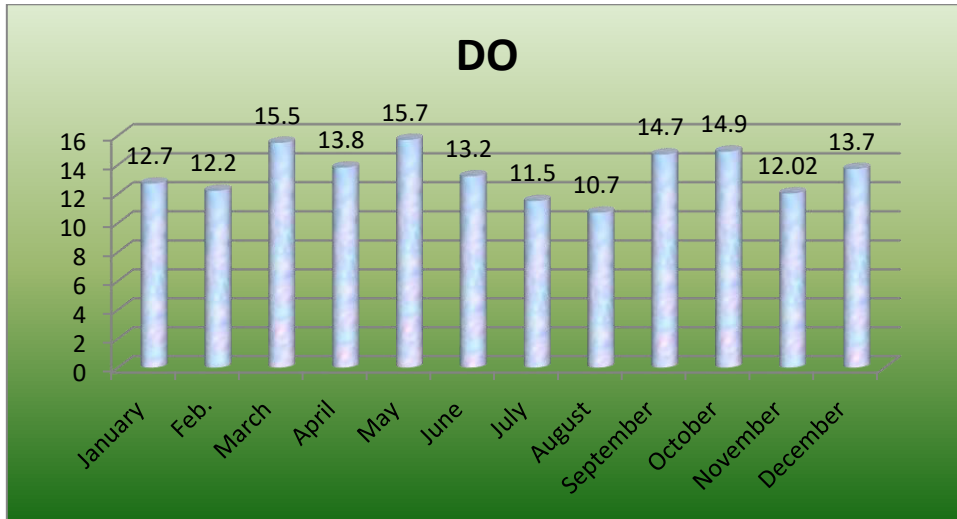
analysis of TDS shows variation. TDS in the month of November was 101 which was comparatively higher and lowest TDS observed in the month of September i.e. 65.7 mg/litre. The analysis of Turbidity shows variation. Turbidity in the month of December was 4.9 it was comparatively higher and lowest Turbidity observed in the month of January i.e. 2.5 mg/litre. The analysis of Chlorides shows variation. Chloride value in the month of April was 16.9 it was comparatively higher and lowest Chlorides observed in the month of December i.e. 10.7 mg/litre. The analysis of Hardness shows variation. Hardness in the month of December was 36.5 which was comparatively higher and lowest Hardness observed in the month of January i.e. 14.5. The analysis of Calcium shows variation. Calcium in the month of April was 25.8 which were comparatively higher and lowest Calcium observed in the month of December i.e. 19.9 mg/litre.



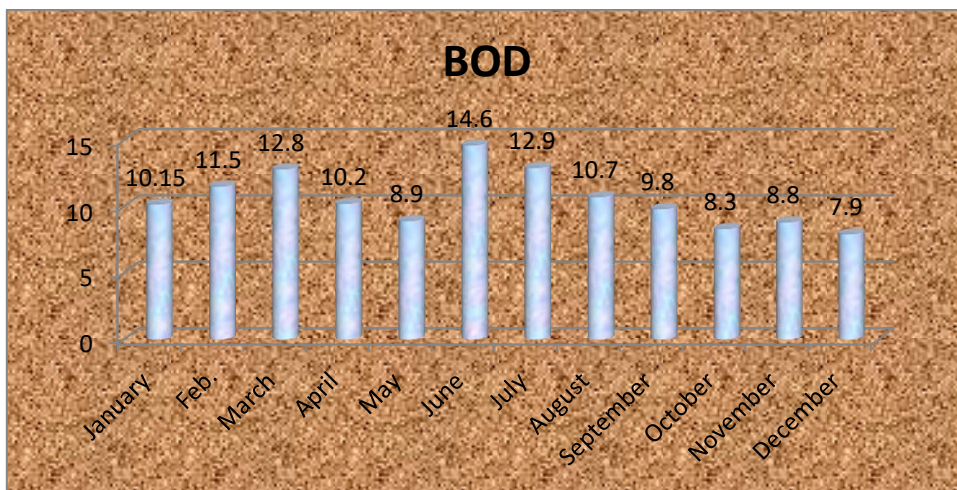
Graph No.1: Observed values of temperature (January to December 2021)



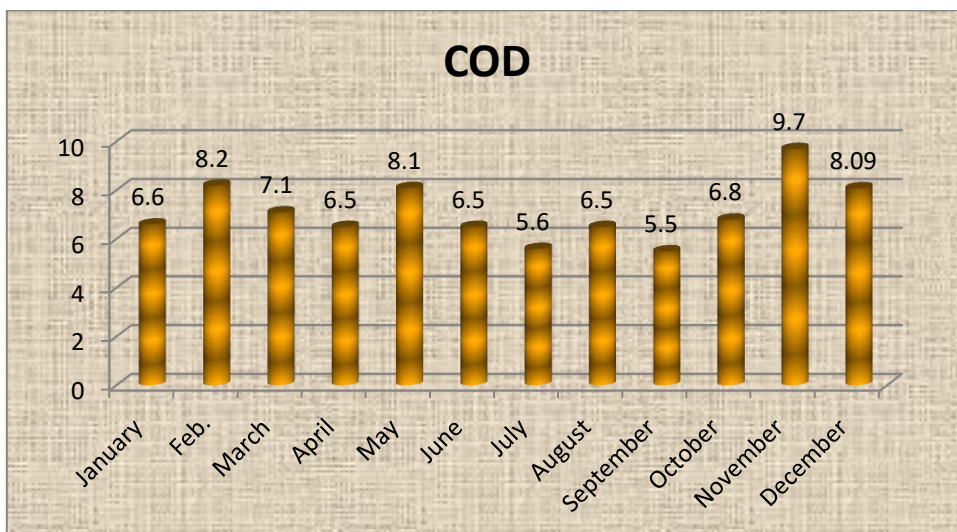
Graph No.2: Observed values of pH (January to December 2021)



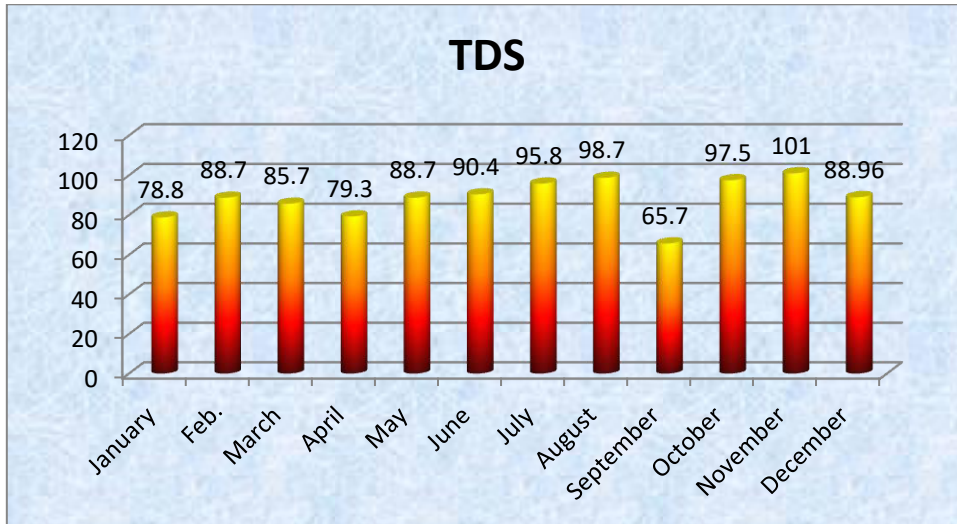
Graph No.3: Observed values of DO (January to December 2021)



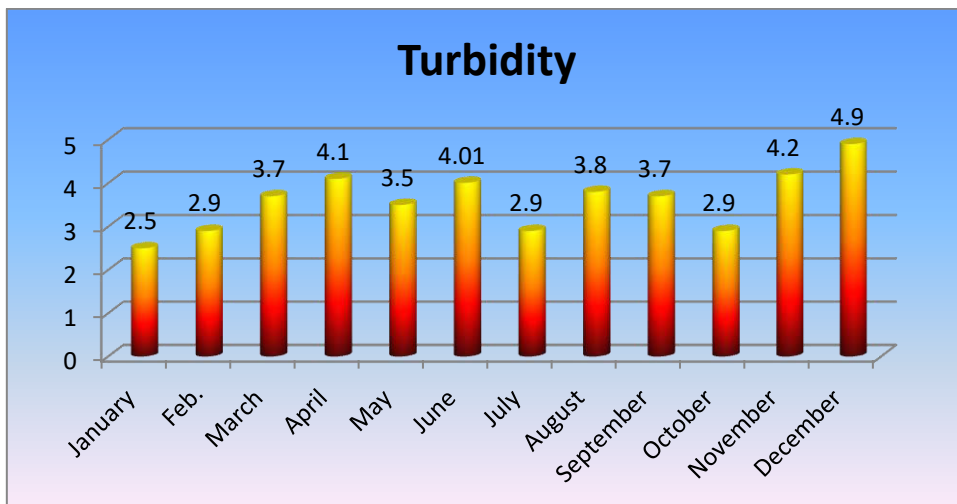
Graph No.4: Observed values of BOD (January to December 2021)



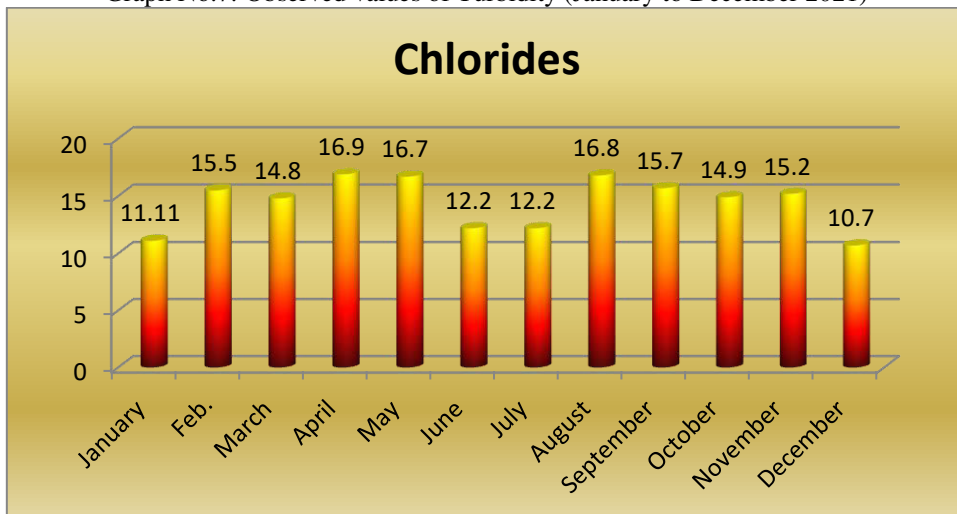
Graph No.5: Observed values of COD (January to December 2021)



Graph No.6: Observed values of TDS (January to December 2021)

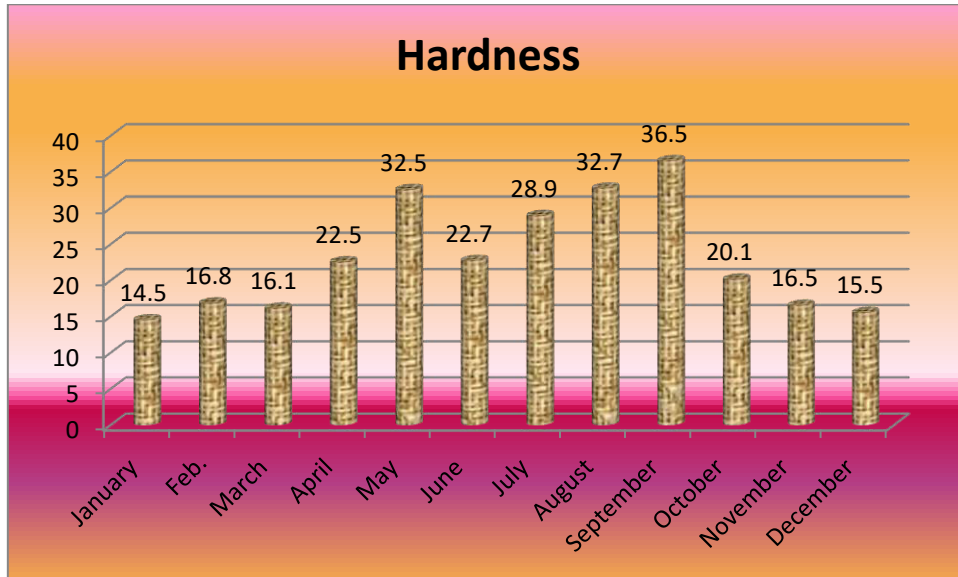


Graph No.7: Observed values of Turbidity (January to December 2021)

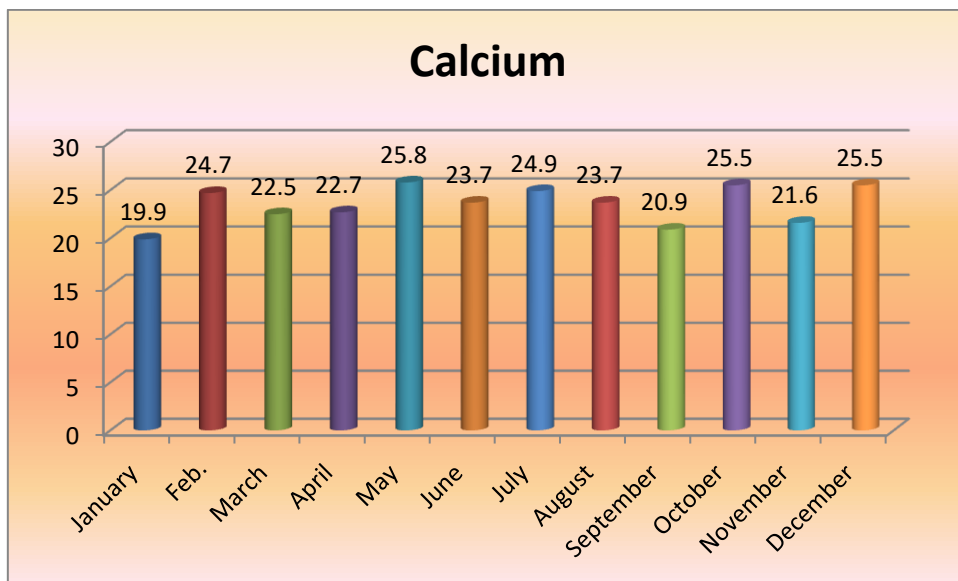


Graph No.8: Observed values of Chlorides (January to December 2021)





Graph No.9: Observed values of Hardness (January to December 2021)



Graph No.10: Observed values of Calcium (January to December 2021)

## V. CONCLUSION

Water is one of the crucial liquid medium to support life on the Earth in the form of Flora and Fauna. Apart from providing the benefits to biota, it acts as fundamental component to abiotic factors too. The analysis of temperature shows that there is significant variation in temperature status. Temperature in the month of July was 26.7 and lowest temperature observed in the month of January was 20.1 mg/litre. pH in the month of December 8.2 which was relatively higher and lowest pH observed in the month of February which was 5.9 mg/litre. The analysis of Dissolved oxygen (DO) shows that there is significant variation. Dissolved oxygen in the month of May was 15.7, it was comparatively higher and lowest Dissolved oxygen observed in the month of August which was 10.7 mg/litre. Biochemical oxygen demand in the month of June was 14.6 which was comparatively higher and lowest Biochemical oxygen demand observed in the month of December which was 7.9 mg/litre. Chemical oxygen demand in the month of November was 9.7 which comparatively higher and lowest Chemical oxygen demand observed in the month of September i.e. 5.5 mg/litre. TDS in the month of November was 101 which was comparatively higher and lowest TDS observed in the month of September i.e. 65.7 mg/litre. Turbidity in the month of December was 4.9 it was



comparatively higher and lowest Turbidity observed in the month of January i.e. 2.5 mg/litre. Chloride value in the month of April was 16.9 it was comparatively higher and lowest Chlorides observed in the month of December i.e. 10.7 mg/litre. Hardness in the month of December was 36.5 which was comparatively higher and lowest Hardness observed in the month of January i.e. 14.5. Calcium in the month of April was 25.8 which was comparatively higher and lowest Calcium observed in the month of December i.e. 19.9 mg/litre. The present work has great potential to estimate the ground water quality as there is demand is increasing at global level.

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