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Monitoring of Waste Water, NUH Town

Syed Abdullah Mujeeb[1], Nadeem Ahmad Khan[2] and Sahil Khan[3]

[1,3]Student Final Year, MECW Affiliated to MDU, Rohtak
[2]MECW Affiliated to MDU, Rohtak
E-mail: [1]msyedabdullah@gmail.com, [2]er.nadimcivil@gmail.com, [3]sahilkhan.khan029@gmail.com

Abstract—*In India almost all the regions are badly polluted & suffering from water pollution, because disposal of wastewater generated from municipal, colleges, industrial sources like beverages plant etc. with little or no treatment prior to discharge the WASTE WATER, in ponds is a common practice. This practice has been continuing over the history of civilization. The Waste water which originates from different industries, beverages plant drain. is one of the waste which are badly polluted as it receives huge quantities of untreated industrial wastewater and solid waste*

Waste water is the major problem in Nuh region, the region Nuh originated from village Ghasera & stretch till village Tajpur, in District Nuh. Throughout its Stretch wastewater is heavily polluted, Municipal drain and waste water from industries, colleges schools etc.

INTRODUCTION-

Water is most essential but scarce part of environment and its availability is indispensable for human beings, the functioning of biosphere and to the economic development. A long believed illusion that, water is an inexhaustible natural resource has led to the misuse of water resources. The result is diminished stream flows, polluted rivers, falling ground water tables and contaminated ground water resources .Presently the quality and the availability of the fresh water resources in the most pressing of the many environmental challenges on the national horizon. The stress on water resources is from multiple sources and the impacts can take diverse forms, geometric increase in population coupled with rapid urbanization and agricultural development has resulted in high impact on quality and quantity of water in our country.

The various sources of water available on the earth are:-

1.1- Surface sources: - such as ponds, lakes, streams, storage reservoirs and oceans.

1.2- Underground sources: - springs infiltration galleries, infiltration wells, wells and tube well.

Availability of water resources required for the survival of living creatures and natural ecosystem is shrinking at an alarming rate.

NUH region is facing waste water problem very much ,beverages plant drain, colleges drain are directly discharged into the environment.

Canal and pond are also polluted due to waste water.

OBJECTIVE OF THE PRESENT STUDY-

The growth of industrial activities, agricultural and urban centers along river side has led to decrease in river flow due to increased extraction of water for irrigation purpose with simultaneous increase in discharge of effluents and wastewaters. Thus the main thrust of the present study is to statistically analyze the waste water quality data of dry weather so as to assess the impact of anthropological activities.

- To determine the existing condition of the NUH region.
- To assess the impact of human activities on the NUH region.
- To generate data used as a tool for sound watershed and community level decisions.
- For water quality monitoring, following parameters are analyzed in three groups of parameters, 14 in all. The present study does not include biological parameters,

Physical: - color, odour, TDS, conductivity.

Chemical: - pH, DO, BOD, COD, hardness, alkalinity, chlorides, fluorides, nitrate, Sulfate.

The parameters are compared with CPCB classification of water, drinking water, recreational water, irrigation and industrial cooling Water standards.

Specifically the study was carried out on the following lines.

- Statistical analysis and comparison of waste water quality data with CPCB standards.
- Statistical analysis to assess the temporal and spatial variation in monitored parameters during dry weather to evaluate the trends in waste water quality.
- To find out the possible causes of Nuh region water pollution.

To suggest the methods for preventing from being polluted.

Figure 1: shows the map of MEWAT REGION presently known as NUH.

WATER CLASSIFICATION-

In India central pollution control board (CPCB) classified river water into five classes, have been designated (A to E) on the basis of the water quality requirements for a particular use:

- **Class A**: - water for use as drinking water source without conventional treatment but after disinfection.
- **Class B**: - use for bathing.
- **Class C**: - use as drinking water source with conventional treatment followed by disinfection.
- **Class D**: - water to maintain aquatic life. (I.e. propagation of wild life and fisheries).
- **Class E**: - use for irrigation, industrial cooling and controlled waste disposal.

The above five classes have been used to set quality objectives for stretches of Waste and surveys have been carried out to compare the actual river quality classification with that required to sustain the designated best use. After comparing ambient water quality with the designated water quality objective, any deficiencies will require appropriate pollution control measures on the discharges, in upstream stretches.

3.1- PRIMARY WATER QUALITY CRITERIA FOR DESIGNATED- BEST-USE-CLASSES-

Table 1

Designated best use	Class of water	Criteria
Drinking water source without conventional treatment but after disinfections.	A	1. Fecal coli forms organism MPN/100ml shall be 50 or less. 2. pH between 6.5 to 8.5 3. Dissolved oxygen 6 mg/l or more. 4. Biochemical oxygen demand 5 days at 20^0 C 2mg/l or less.
Outdoor bathing	B	1. Fecal coli forms organism MPN/100ml shall be 500 or less. 2. pH between 6.5 to 8.5 3. Dissolved oxygen 5 mg/l or more. 4. Biochemical oxygen demand 5 days at 20 °C 3 mg/l or less.
Drinking water source after conventional treatment and disinfections.	C	1. Fecal coli forms organism MPN/100ml shall be 5000 or less. 2. pH between 6 to 9 3. Dissolved oxygen 4 mg/l or more. 4. Biochemical oxygen demand 5 days at 20^0 C 3 mg/l or less.
Propagation of wild life and fisheries.	D	1. pH between 6.5 to 8.5 2. Dissolved oxygen 4 mg/l or more. 3. Free ammonia (as N) 1.2 mg/l or less.
Irrigation, industrial cooling, controlled waste disposal.	E	1. pH between 6.0 to 8.5 2. Electrical conductivity at 25^0C micro mhos/cm max. 2250 3. Sodium absorption ratio max. 26 4. Boron max. 2.0 mg/l

ATERIALS AND METHODS-

4.1- General Characterstics Of Monitoring Of Waste Water-

Water quality monitoring is the systematic and careful collection of samples and exhaustive analysis of data. Water quality monitoring is to be carried out to acquire the knowledge and information on existing water quality of the water body. It is important to monitor the water quality so that water resources can be managed fairly, contaminants and their effects can be detected and controlled. The sampling of river

water that receives urban and industrial discharges, so as to measure their quality and compare it with water quality guidelines as laid by various agencies, is a form of monitoring. An effective monitoring program is designed to measure and report on or provides understanding about, a particular situation or set of issues.

Water quality is the physical, chemical and biological characteristic of water usually in respect to its suitability for a particular use. The primary bases for such characterization are parameters which relates to drinking water, safety of human contact and for health of ecosystems. The vast majority of surface water on the planet is neither potable nor toxic. Water quality is that of a simple property that indicates whether water is polluted or not.

The presence of contaminants and the characteristics of water are used to indicate the quality of water. These water quality indicators can be categorized as:-

- Physical water quality parameters: color, odour, suspended solids, temperature, turbidity.
- Chemical: BOD, DO, COD, pH, organic and inorganic compounds.

Measurement of these indicators can be used to determine and monitor changes in water quality and determine whether the quality of the water is suitable for the health of the natural environment and the uses for which the water is required.

4.2- SAMPLING –

The objective of sampling is to collect a portion of waste water small enough in volume to be transported conveniently and handled in the laboratory while still accurately representing the water quality being sampled. This implies that the relative proportions or concentrations of all pertinent component will be the same in the samples as in the waste water being sampled, and the sample will be handled in such a way that no significant changes in composition occur between the test are made. There is no universal procedure for sampling. Sampling programs are tailored individually to fit each situation. Attempt is made to study the various river quality parameters to study the influence of discharge of domestic and industrial wastewaters. For analysis, waste water quality data of the dry period, i.e. for the months March, April through May, were considered. This is done to avoid effect of excessive dilution of pollutants in waste water during rainy season.

The Sampling is done in the month of March 2016, and April 2016 and composite sampling method was chosen for the collection of the samples, which reflects performance at the points of sampling. The samples were collected in 2 liter plastic bottles ensuring proper preservation. Before filling, rinse sample bottle out two or three times with the water being collected. The water samples were subjected to analysis within 24 hours of collection for the physicochemical parameters which are as follows:

PH, dissolved oxygen, biological oxygen demand, chemical oxygen demand, total dissolved solids, chlorides ions, turbidity, sulfates, total hardness.

The samples are collected from canal, pond, industrial waste, engineering & medical college waste and by filling the containers held about 0.3 to 0.5 meter beneath the surface of water.

4.3- SAMPLING STATIONS-

Overall, six sites were selected for sampling on Waste water. The locations of the sampling stations are as shown in the figure 2. These stations are so chosen, in order to study the influence of discharge of municipal and industrial wastewater drain.

1. Pepsi plant mix, Hodal road, Ujina ,Nuh
2. Pepsi Plant equalization pond, Hodal road ,Ujina ,Nuh.
3. POND,NUH,
4. Canal, NUH- TAURU Road ,NUH.
5. SHKM medical college waste water tank, Nalhad, NUH.
6. MECW waste water tank, palla ,NUH.

OBSERVATIONS-

Table 2

WATER QUALITY PARAMETERS (MARCH. 2016)

SAMPLING STATIONS	COLOR	TEMP. (°C)	ODOUR	TDS (mg/l)	CONDUCTIVITIY	PH	DO (mg/l)	BOD (mg/l)	COD (mg/l)	SULFATES (mg/l)	FLUORIDES (mg/l)	ALKLAINITY (mg/l)	HARDNESS (mg/l)
MECW	**Slightly black**	**28.6**	**fouling smell**	**962**	**1057, k=0.200cm^-1**	**7.80**	**1.86**	**240**	**20**	**38**	**0.79**	**52**	**568**
MEDICAL COLLEGE	**Light black**	**23.6**	**fouling smell**	**3.3g/l**	**971, k=0.072cm^-1**	**7.34**	**0.22**	**224**	**5**	**3**	**0.18**	**44**	**1720**

\ CANAL NUH	**dark yellow**	**27.6**	**Odourless**	**1078**	**1048, k=0.19cm^-1**	**7.1**	**0.35**	**378**	**180**	**76(D50)**	**0.22**	**196**	**344**
POND NUH	**slightly yellow**	**27.5**	**fish like smell**	**5.11 g/l**	**1024,k=0.041cm-1**	**8.58**	**1.53**	**377**	**110**	**48(D10)**	**0.16**	**94**	**958**
PEPSI MIX PLANT	**Dark black**	**23.3**	**slightly H2S smell**	**1708**	**973,k=0.016cm^-1**	**8.04**	**0.22**	**380**	**3**	**6**	**0.11**	**184 (D50)**	**1720**
PEPSI EQUALIZATION TANK	**light pink**	**23.1**	**Odourless**	**5.87 g/l**	**969,k=0.036cm^-1**	**9.18**	**0.96**	**510**	**5**	**102 (D10)**	**3.01**	**106**	**1574**

WATER QUALITY PARAMETERS IN (APRIL 2016)

Table 3

POTENZ HYDROGEN (PH)

SAMPLING SAMPLING STATIONS	**COLOR**	**TEMP. (°C)**	**ODOUR**	**TDS (mg/l)**	**CONDUCTIVTIY**	**PH**	**DO (mg/l)**	**BOD (mg/l)**	**COD**	**SULFATES (mg/l)**	**FLUORIDES (mg/l)**	**ALKLAINITY (mg/l)**	**HARDNESS (mg/l)**
MECW	**Slightly black**	**26.9**	**fouling smell**	**1023**	**1051, k=0.212cm^-1**	**8.1**	**3.56**	**195**	**17**	**21**	**0.65**	**64**	**424**
MEDICAL COLLEGE	**Light black**	**27.2**	**fouling smell**	**3.5g/l**	**1013, k=0.084cm^-1**	**7.8**	**1.43**	**182**	**3**	**1.65**	**0.11**	**56**	**1430**
CANAL NUH	**dark yellow**	**27.7**	**Odourless**	**847**	**1051, k=0.229cm^-1**	**8.84**	**2.29**	**260**	**100**	**98(D50)**	**0.05(D10)**	**190**	**316**
POND NUH	**slightly yellow**	**27.6**	**fish like smell**	**5.37g/l**	**1054,k=0.039 cm-1**	**9.35**	**5.24**	**245**	**97**	**77(D10)**	**0.05(D10)**	**140**	**1042**
PEPSI MIX PLANT	**dark black**	**27.9**	**slightly H2S smell**	**1818**	**1057,k=0.032 cm^-1**	**7.53**	**0.25**	**261**	**1**	**19**	**0.1(D5)**	**240 (D50)**	**400**
PEPSI EQUALIZATION TANK	**light pink**	**27.3**	**Odourless**	**6.5g/l**	**1052,k=0.109 cm^-1**	**9.38**	**2.29**	**428**	**2**	**115 (D10)**	**0.18(D10)**	**80**	**1528**

Table 4

PERMISSIBLE LIMIT 6.5 TO 8.5

SAMPLING STATIONS	**1**	**2**	**3**	**4**	**5**	**6**
MONTH WISE DATA	**MECW**	**MED COLLEGE**	**CANAL**	**POND**	**PEPSI MIX**	**PEPSI EQUALIZATION**
MARCH	7.8	7.34	7.1	8.5	8.04	9.18
APRIL	8.1	7.8	8.84	9.35	7.53	9.38

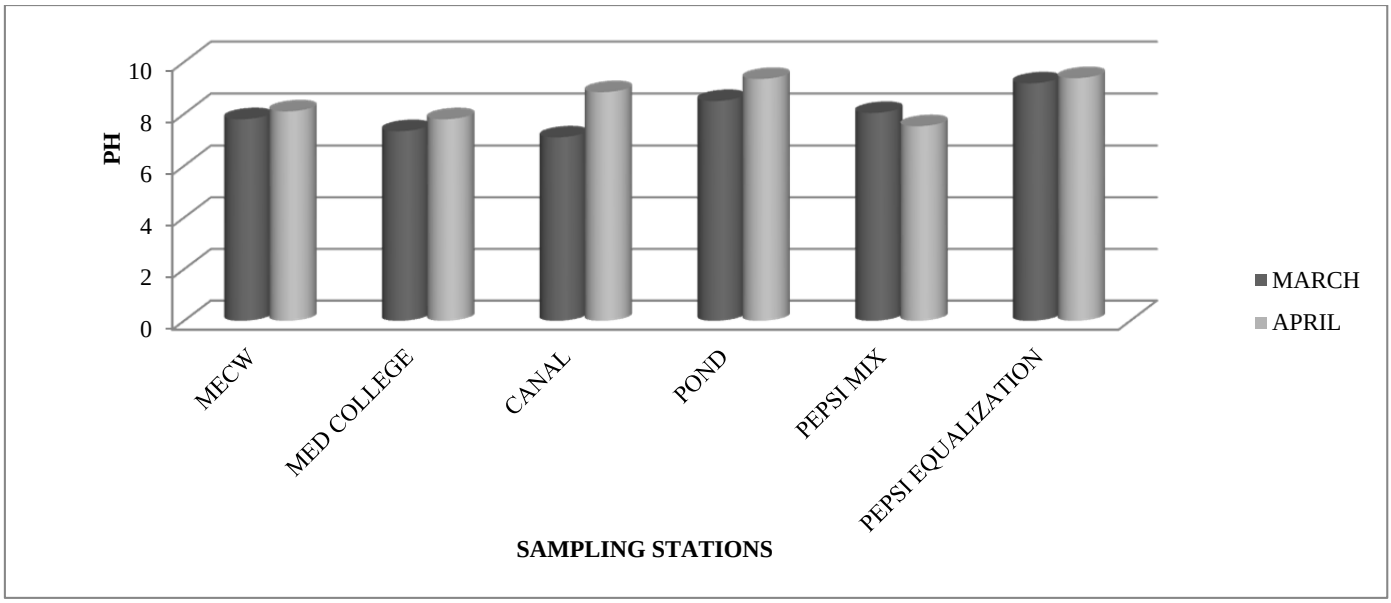

FIGURE 2

DISSOLVED OXYGEN

Table 5

PERMISSIBLE LIMIT 6.0 mg/l

SAMPLING STATIONS	1	2	3	4	5	6
MONTH WISE DATA	MECW	MED COLLEGE	CANAL	POND	PEPSI MIX	PEPSI EQUALIZATION
MARCH	1.86	0.22	0.35	1.53	0.22	0.96
APRIL	3.56	1.43	3.83	5.24	0.25	2.29

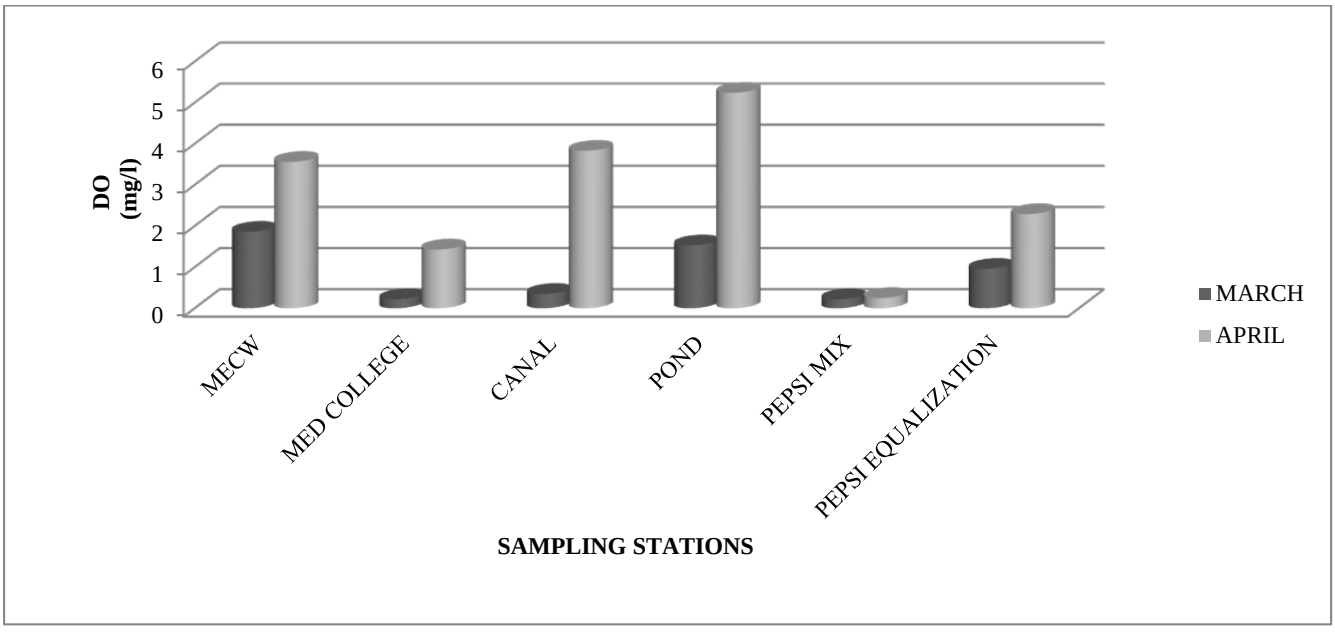

FIGURE 3

B.O.D. IN mg/L

Table 6

PERMISSIBLE LIMIT 2.0 mg/l

SAMPLING STATIONS	1	2	3	4	5	6
MONTH WISE DATA	MECW	MED COLLEGE	CANAL	POND	PEPSI MIX	PEPSI EQUALIZATION
MARCH	240	224	378	377	380	510
APRIL	195	182	260	245	261	428

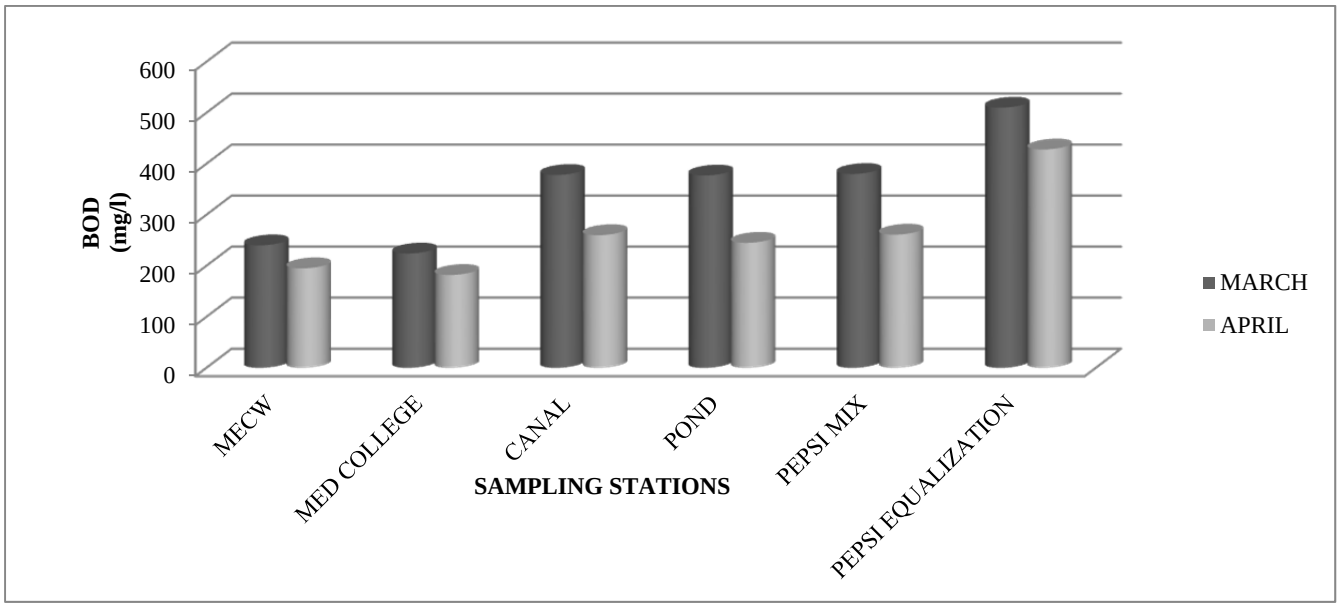

FIGURE 4

COD

Table 7

PERMISSIBLE LIMIT 250 mg/l

SAMPLING STATIONS	1	2	3	4	5	6
MONTH WISE DATA	MECW	MED COLLEGE	CANAL	POND NUH	PEPSI MIX	PEPSI EQUALIZATION
MARCH	20	5	180	110	3	5
APRIL	17	3	100	97	1	2

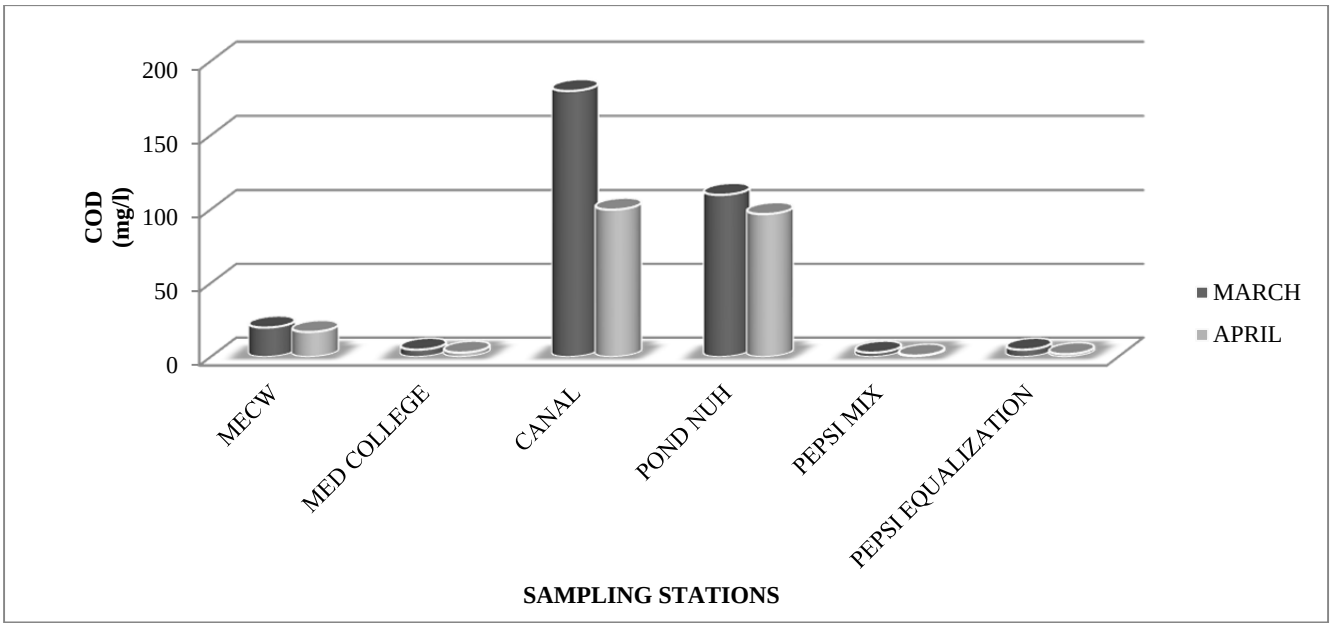

FIGURE 5

TOTAL DISSOLVED SOLIDS IN mg/l

Table 8

PERMISSIBLE LIMIT 500 mg/l

SAMPLING STATIONS	1	2	3	4	5	6
MONTH WISE DATA	MECW	MED COLLEGE	CANAL	POND	PEPSI MIX	PEPSI EQUALIZATION
MARCH	962	3300	1078	5110	1708	5870
APRIL	1023	3512	847	5370	1818	6500

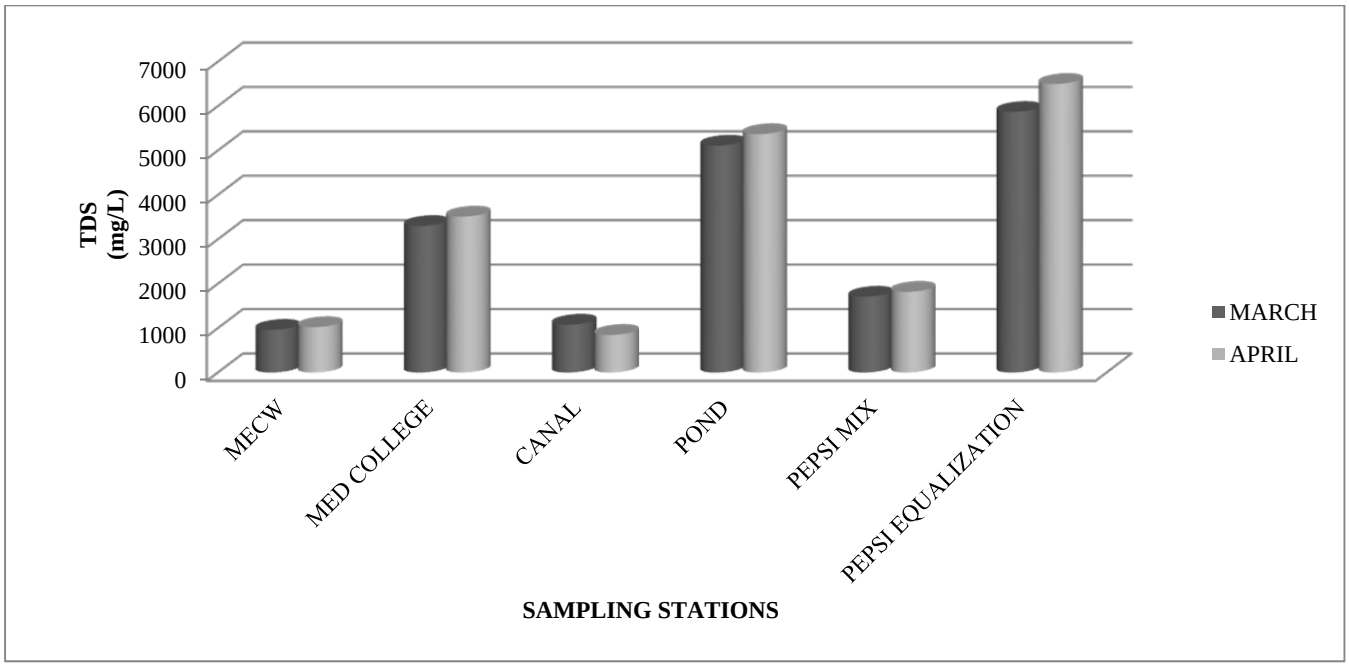

FIGURE 6

ELECT. CONDUCTIVITY IN (µs/cm)

Table 9

PERMISSIBLE LIMIT 1000 (µs/cm)

SAMPLING STATIONS	1	2	3	4	5	6
MONTH WISE DATA	MECW	MED COLLEGE	CANAL	POND	PEPSI MIX	PEPSI EQUALIZATION
MARCH	1057	971	1048	1024	973	969
APRIL	1051	1013	1051	1054	1057	1052

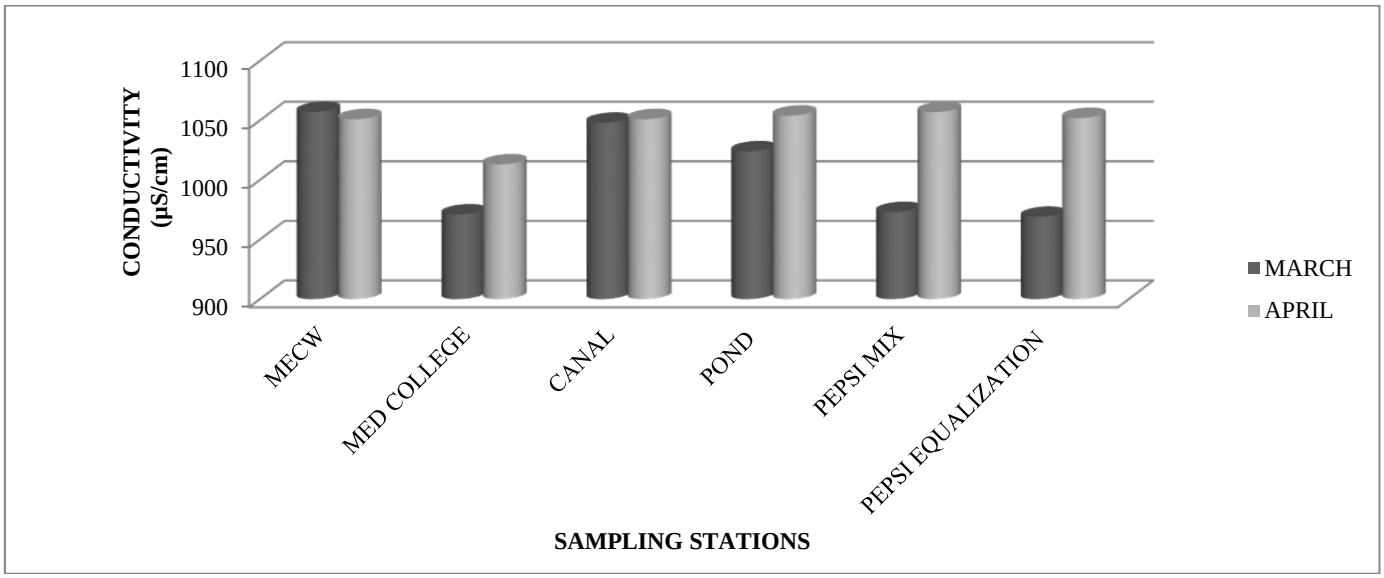

FIGURE 7

TOTAL HARDNESS IN (mg/l)as Caco3

Table 10

PERMISSIBLE LIMIT 300 mg/l

SAMPLING STATIONS	1	2	3	4	5	6
MONTH WISE DATA	MECW	MED COLLEGE	CANAL	POND	PEPSI MIX	PEPSI EQUALIZATION
MARCH	568	1720	344	958	1720	1574
APRIL	424	1430	316	1042	400	1582

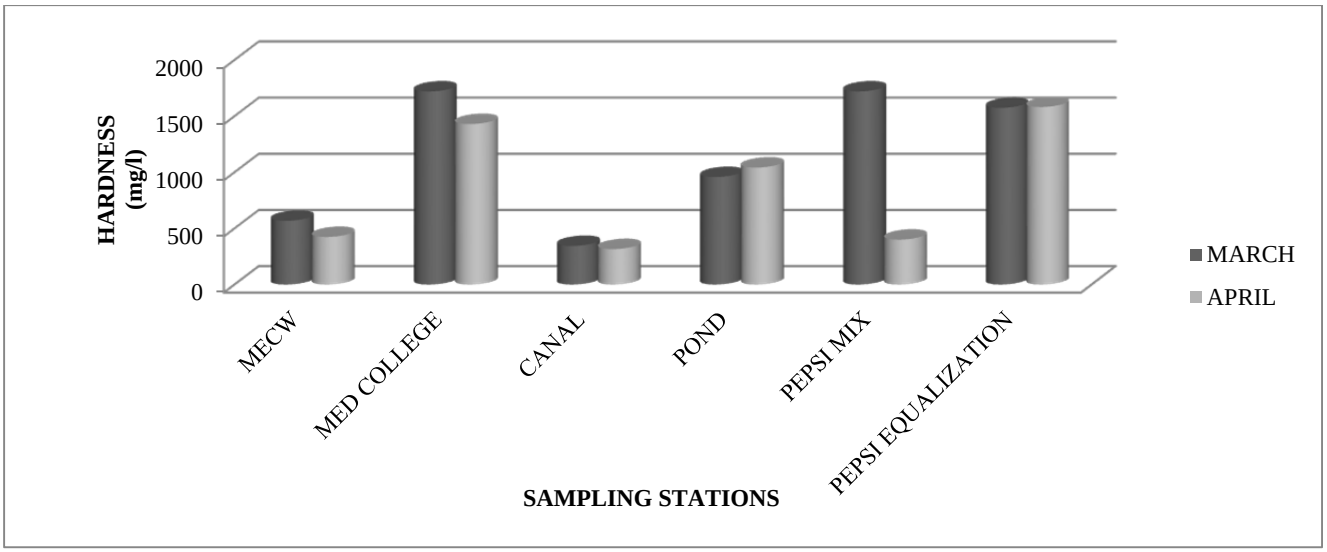

FIGURE 8

ALKALINITY AS Caco3 in mg/l

Table 11
PERMISSIBLE LIMIT 200 mg/l

SAMPLING STATIONS	1	2	3	4	5	6
MONTH WISE DATA	MECW	MED COLLEGE	CANAL	POND	PEPSI MIX	PEPSI EQUALISATION
MARCH	52	44	196	94	9200	184
APRIL	32	56	190	140	12000	80

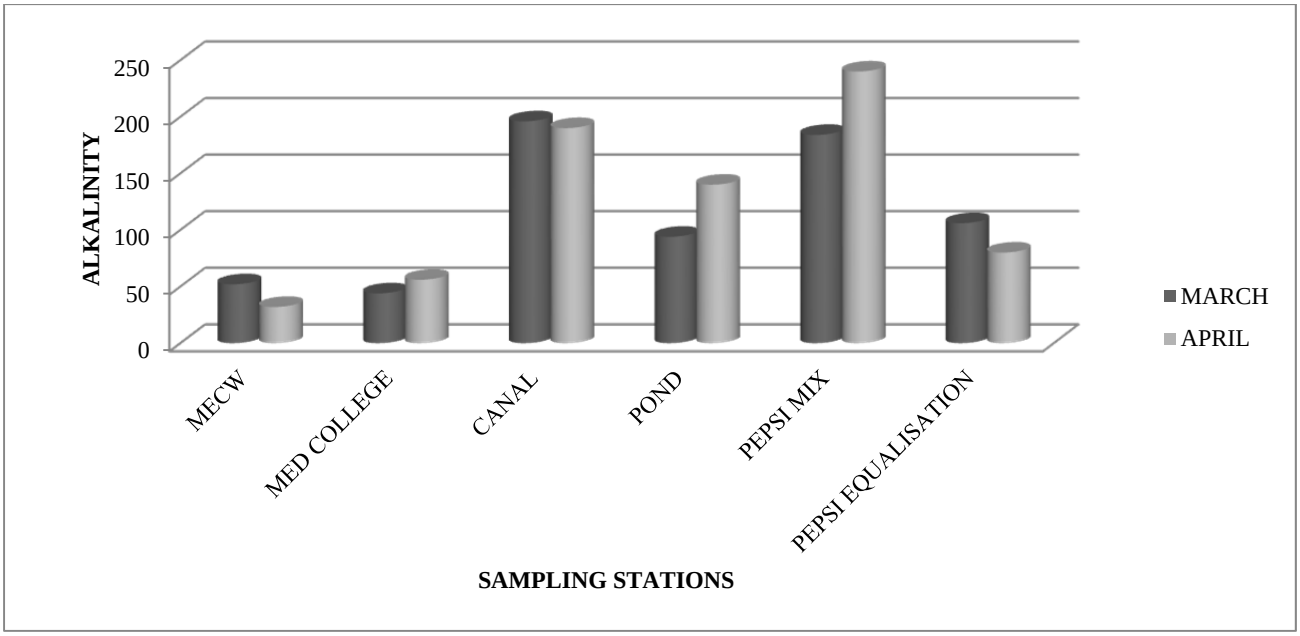

FIGURE 8

FLUORIDES AS (F) IN mg/l

Table 12

PERMISSIBLE LIMIT 1.0 mg/l

SAMPLING STATIONS	1	2	3	4	5	6
MONTH WISE DATA	MECW	MED COLLEGE	CANAL	POND	PEPSI MIX	PEPSI EQUALIZATION
MARCH	0.79	0.18	0.22	0.16	0.11	3.01
APRIL	0.65	0.11	0.5	0.5	0.5	1.8

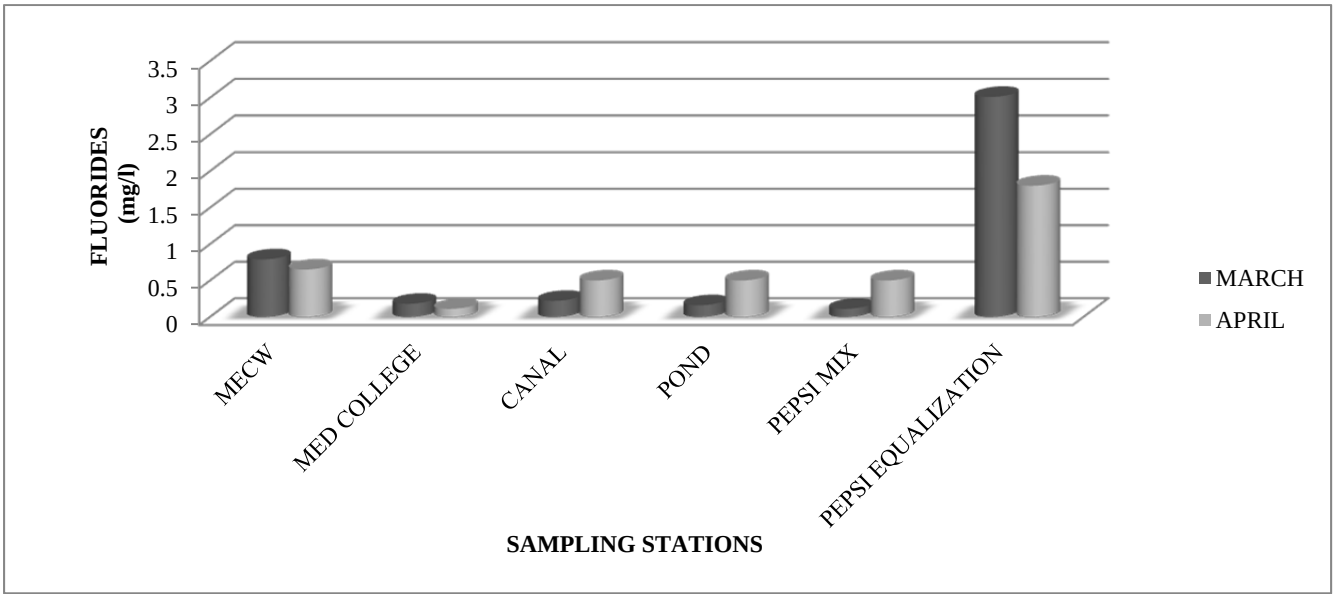

FIGURE 9

SULFATES IN mg/l

Table 13

PERMISSIBLE LIMIT 200 mg/l

SAMPLING STATIONS	1	2	3	4	5	6
MONTH WISE DATA	MECW	MED COLLEGE	CANAL	POND	PEPSI MIX	PEPSI EQUALIZATION
MARCH	38	3	3800	480	6	102
APRIL	21	1.65	4900	770	190	1150

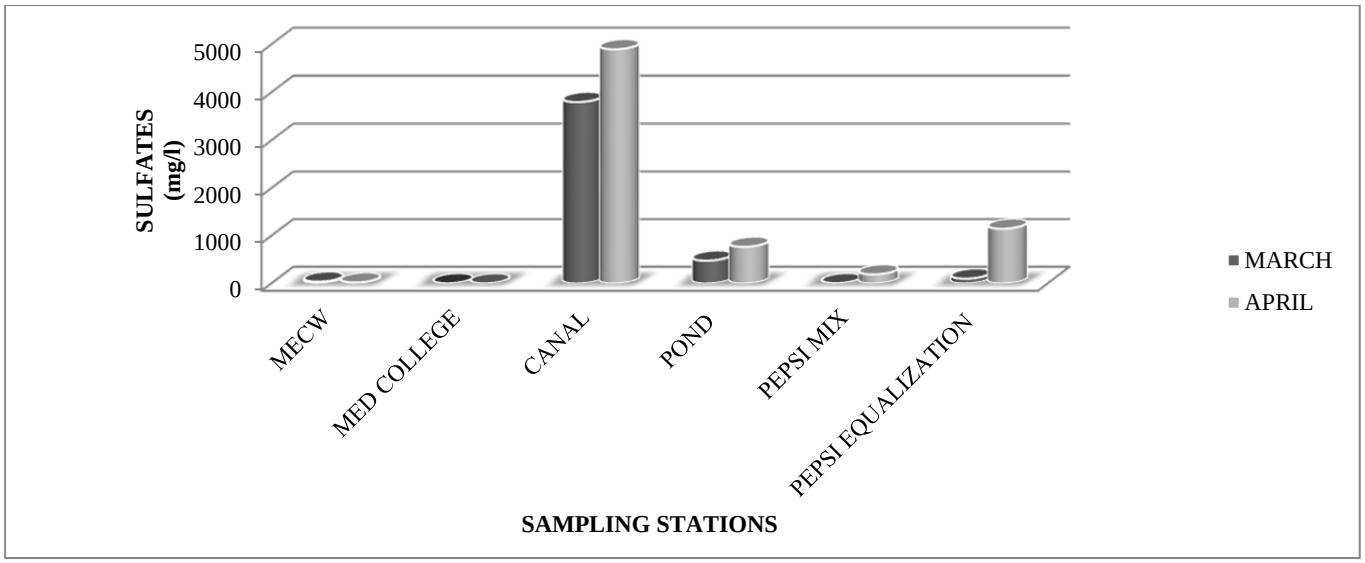

FIGURE 10

Comparison of analyzed parameters with irrigation water standards. All values in mg/l except pH & conductivity

Table 14

PARAMETERS	STANDARD VALUE	Canal Nuh	Pond Nuh	REMARKS
PH	5.5- 9.0	7.97	9.09	Acceptable For Canal
B.O.D.	100.0	311.5	319	Not Acceptable
CONDUCTIVITY	2250	1049	1039	Acceptable
TDS	2100	962.5	5240	Acceptable
FLUORIDES	1.0	0.36	0.33	Acceptable
CHLORIDE	600	Nil	Nil	Acceptable
SULFATE	1000	4350	625	Acceptable For Pond

RESULTS & DISCUSSION-

The present study was carried out to assess the waste water quality of Nuh town. The sampling was done at six sampling stations. These samples were analyzed during the month of march 2016 and April 2016 to see the effect of season and compare the various parameters of the waste water during the seasons.

The waste water temperature in the month of march 2016 were in the range of 22 °C to 32 °C and 31 °C to 42 °C in the month of April 2016 from morning till evening at different sampling stations. Temperature is known to influence the pH, alkalinity and D.O. concentration in water.

The value of PH varies from 7.1 to 9.38 at different stations. CANAL, POND & PEPSI EQUALIZATION have higher value of PH, hence these water are more alkali.

The DO in the waste water is almost negligible in the stretch.it varies from 0.25 to 5.24 DO in good quality water is usually more than 6 ppm to promote proper growth of

fish and other aquatic life. The depletion of dissolved oxygen in the water seems to be due to microbial decomposition of the organic matter. High loads of organic pollution reaching the WASTE from various beverages plant and municipal drains lead to low oxygen. Hence no survival of fish and other aquatic organisms is possible while collecting the samples discussion with local people also indicate the same statement.

The BOD value in NUH at different stations varies with 182 to 510 mg/l at different stations. Pepsi Equalization & Pepsi Mix have higher values of BOD, the high values of BOD may be due to untreated wastewater discharges into the tank & pond. The COD values at NUH was 1 to 180 mg/l. Canal & Pond has higher values of COD

The hardness of the waste water was found 316 to 1720 mg/l. Water with a hardness of 50 ppm is considered to be soft. Hardness of 300 ppm is, however, permissible for domestic use, value of hardness in MECW vary from 424 to 568 ppm , In SHKM medical college, Value is the highest i.e. 1720ppm whereas it should be 2 to 80 ppm for boilers feeders. Hence the waste water is hard.

TDS varies from 847 to 6500 ppm. The value of TDS at SHKM Medical College, Nalhad, Nuh was 3300 and 3510 ppm in the month of March &April 2016. In MECW it varies

from 962 to 1023. The PEPSI plant drain caused very much increase in the TDS concentration of the waste water i.e. 6500ppm. The concentration was found higher in the month of April.

Conductivity varies from 971 to 1057µs/cm. almost all stations have same amount of conductivity .Hence this water is brackish & Unfit for Irrigation.

The alkalinity of water varies from 52 to 12000 mg/L as $caco_3$ at different stations. But due to depletion of dissolved oxygen no algae growth and aquatic life is observed.

The chlorine concentration is nil.

The sulfate concentration varies from 1.65 TO 4900 mg/l .Canal, pond, usually contribute to sulfate. Agriculture field run off water also contribute to sulfate. Value more than 250 mg/l produced a laxative effect on human system.

- Fluoride Varies From 0.11 To 3.01 Mg/L While Permissible Limit Is 1.0 Mg/L Of Drinking Water Standards. Pepsi Equalization has maximum value 3.01, it is highly toxic to human beings as well for aquatic animals.

CONCLUSIONS-

- The Water Quality Is Not Fit For Drinking But Canal & Pond Water Can Be Used For Recreational Purpose Under Present Study.
- Water Quality Is Not Suitable For Industrial Cooling Due To Higher Tds And Hardness.
- Aquatic & Wild Life Cannot Survive For Much Period Of Time Using This Waste Water As Suggested By Central Pollution Control Board (CPCB).
- The Waste Maintains Slightly Better Water Quality In MECW As Compared To SHKM Medical College And Other Stations.
- Water Quality Degrades At Pepsi Equalization & Pepsi Mix Below The Standards And Is In Fact Unfit For Any Use.
- For Canal & Pond, Central Pollution Control Board (CPCB) Classified Water Source for Irrigation Use as “E” On The Basis Of Water Quality. The Water Quality Analysis For The Present Study Comes Under The Above Classification “E”. Hence It Can Be Used For Irrigation Purposes.

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First and foremost we owe our entire acknowledgement to the almighty ALLAH the most beneficent and merciful. It is his will which has enabled me to accomplish my work which otherwise would not have been possible. we remember with gratitude the encouragement, guidance and illuminative advice that we received from my PROFESSOR**,** Mr. NADEEM AHMAD KHAN, Head of The DEPARTMENT

NOMENCLATURE

CPCB- CENTRE POLLUTION CONTROL BOARD

PH- POTENZ HYDROGEN

BOD- BIOCHEMICAL OXYGEN DEMAND

COD- CHEMICAL OXYGEN DEMAND

TDS- TOTAL DISSOLVED SOLIDS

MECW-MEWAT ENGINEERING COLLEGE(WAQF)

MDU –MAHARSHI DAYANAND UNIVERSITY

SHKM- SHAHEED HASAN KHAN MEWATI MEDICAL COLLEGE.

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