



SHIVAJI UNIVERSITY, KOLHAPUR

REVISED STRUCTURE AND SYLLABUS

SECOND YEAR (B. Tech) CBCS

MECHANICAL ENGINEERING

To be introduced from the academic year 2019-20

(i.e. from June 2019) onwards

COURSE CODE AND DEFINITION

Semester III

Sr. No	Code No.	Subject	Credits
1.	BSC-ME201	Engineering Mathematics - III	4
2.	PCC-ME202	*Electrical Technology	4
3.	PCC-ME203	Applied Thermodynamics	4
4.	PCC-ME204	Metallurgy	4
5.	PCC-ME205	Fluid Mechanics	4
6.	PCC-ME206	Machine Drawing	1
7.	PCC-ME207	*Computer Programming Using C++	1
8.	PCC-ME208	Workshop Practice – III	1
9.	MC-ME209	Environmental studies	3
		Total	26



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 दुरध्वनी (ईपीएबीएक्स) २६०९००० (अभ्यास मंडळे विभाग— २६०९०९४)
 फॅक्स : ००९१-०२३१-२६९१५३३ व २६९२३३३.e-mail:bos@unishivaji.ac.in

SU/BOS/6060

Date:- 19/06/2019

To,

The Principal,
 All Affiliated Colleges/Institutes,
 Shivaji University,
 Kolhapur

Subject: Regarding syllabi of **Environmental Studies for all under graduate degree Programme Part – II** of all faculties.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the University authorities have accepted and granted approval to the syllabi of **Environmental Studies for all under graduate degree programme Part – II** of all faculties.

The concerned syllabi shall be implemented from the academic year 2019-20 (i.e. from June, 2019) onwards. All these syllabi are also made available on University website www.unishivaji.ac.in.

You are therefore requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dy Registrar

Copy to:

1)	I/c Dean, All Faculty	6)	B.Sc. Section
2)	Chairman, Ad-hoc Board of Environmental Studies	7)	Computer Centre
3)	Appointment Section	8)	P.G.Admission
4)	Affiliation Section	9)	P.G.Seminar.
5)	Eligibility Section	

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A' Grade

Syllabus of Environmental Studies

**As a Compulsory Paper for all
Undergraduate Programme**

(To be implemented from academic year 2019)

Shivaji University, Kolhapur
Syllabus of Environmental Studies
as a Compulsory Paper for all Undergraduate Courses
2019-20

Unit 1. Nature of Environmental Studies :

(3 lectures)

Definition, scope and importance.

Multidisciplinary nature of environmental studies

Need for public awareness.

Concept of sustainability. Sustainable development and its goals with Indian context.

Unit 2. Ecosystems :

(9 lectures)

Concept of an ecosystem.

Structure and function of an ecosystem.

Producers, consumers and decomposers.

Energy flow in the ecosystem.

Ecological succession.

Food chains, food webs and ecological pyramids.

Introduction, types, characteristics features, structure and function of the following ecosystem :-

a) Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem,

d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Degradation of the ecosystems and its impacts.

Unit 3. Natural Resources and Associated Problems :

(8 lectures)

a) Forest resources: Use and over-exploitation, deforestation, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Usage and exploitation. Environmental effects of extracting and using mineral resources.

d) Food resources: World food problem, changes caused by agriculture ,effect of modern agriculture, fertilizer-pesticide problems.

e) Energy resources: Growing energy needs, renewable and non- renewable energy resources, use of alternate energy sources. Solar energy , Biomass energy, Nuclear energy,

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Consumerism ,ecological foot prints, carbon foot prints, carbon credits.

Role of an individuals in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Unit 4. Biodiversity and its conservation : (8 lectures)

Introduction- Definition: genetic, species and ecosystem diversity.
 Bio-geographical classification of India.
 Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
 India as a mega- diversity nation.
 Western Ghat as a biodiversity region. Hot-spots of biodiversity.
 Threats to biodiversity: habitat loss, poaching of wildlife, man- wildlife conflicts,
 Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Convention on Biological Diversity.

Unit 5. Environmental Pollution : (8 lectures)

Definition: Causes, effects and control measures of: Air pollution,
 Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution,
 Nuclear hazards.
 Global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.
 Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Solid waste management control rules.
 Role of an individual in prevention of pollution.

Unit 6. Social Issues and the Environment : (9 lectures)

Human population growth, impact on environment. Human Health and welfare.
 Environmental ethics: Role of Indian religious traditions and culture in conservation of the environment.
 Environmental movements- Chipko Movement, Appiko Movement, Silent Valley.
 Resettlement and rehabilitation of people; its problems and concerns.
 Water conservation, rain water harvesting, watershed management. water conservation by Dr.Rajendra Singh, Anna Hazare etc.
 Disaster management: floods, earthquake, cyclone, tsunami and landslides.
 Wasteland reclamation.
 Environmental communication and public awareness, case studies.

Unit 7. Environmental Protection- Policies and practises : (5 lectures)

Environmental Protection Act.
 Air (Prevention and Control of Pollution) Act.
 Water (Prevention and control of Pollution) Act
 Wildlife Protection Act
 Forest Conservation Act
 National and International conventions and agreements on environment.

Unit 8. Field Work :**(10 lectures)**

Visit to a local area to document environmental assets-

River/forest/grassland/hill/mountain.

or

Visit to a local polluted site – Urban/Rural/Industrial/Agricultural

or

Study of common plants, insects, birds.

or

Study of simple ecosystems - ponds, river, hill slopes, etc.

(Field work is equal to 10 lecture hours)

References :

- 1) Agarwal, K.C.2001, Environmental Biology, Nidi Pubi. Ltd., Bikaner.
- 2) Bharucha Erach, The Biodiversity of India, Mapin Publishing pvt. Ltd.,Ahmedabad 380013, India, Email:mapin@icenet.net (R)
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- 4) Clank R.S. Marine Pollution, Clanderson Press Oxford (TB)
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- 6) Environmental Encyclopedia, Jaico Publ. Hpise, Mumbai, 1196p
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- 11) Heywood, V.H.& Watson, R.T.1995, Global Biodiversity Assessment,Cambridge Univ. Press 1140p.
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- 17) Rao M.N.& Datta, A.K.1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd., 345p
- 18) Sharma B.K., 2001, Environmental Chemistry, Gokel Publ. Hkouse, Meerut
- 19) Survey of the Environment, The Hindu (M)
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- 21) Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, vol. I anfd II, Environmental Media (R)
- 22) Trivedi R.K. and P.K. Gokel, Intriduction to air pollution, Tecgbi-Science Publications (TB)
- 23) Wagner K.D.,1998, Environmental management, W.B. Saunders Co.Philadelphia, USA 499p.
- 24) Paryavaran shastra – Gholap T.N.
- 25) Paryavaran Sahastra – Gharapure
M) Magazine (R) Reference (TB) Textbook

A Project Report On

**“FIELD VISIT TO WATER PURIFICATION PLANT
KASBA BAWADA, KOLHAPUR”**

The Project Submitted

To

Shivaji University, Kolhapur, Maharashtra



In Partial Fulfillment By

Mr. Nitishkumar Bhaskar Patil

Under The Guidance Of

Prof. G.S. GHORPADE

Assistant Professor



Bharati Vidyapeeth's College of engineering Kolhapur,

Department of Mechanical Engineering



BHARATI VIDYAPEETH COLLEGE OF ENGINEERING, KOLHAPUR

Department Of Mechanical Engineering


CERTIFICATE


This is to certify that **Mr. Nitishkumar Bhaskar Patil (1)**, has satisfactorily completed his project report on the topic **“WATER PURIFICATION**


PLANT KASBA BAWADA, KOLHAPUR ”. This report is in partial fulfillment of the requirement of first term of second year of B- TECH , MECH Engineering Bharti Vidyapeeth College of Engineering , Kolhapur for academic year 2021-2022.

Place:- Kolhapur

Date:- / / 2022


Prof . G. S .Ghorpade
(Project Guide)


Dr. S. J. Kadam
(HOD)


Dr. V. R. Ghorpade
(Principal)

DECLARATION

We hereby declare that the project of **ENVIRONMENT STUDIES** entitled

“FIELD VISIT TO WATER PURIFICATION PLANT

KASBA BAWADA , KOLHAPUR ”

Complete and written by me has not previously formed the basic for award of any Degree or Diploma or other similar title of this or any other institute or examining body.

Mr. Nitishkumar Bhaskar Patil (B-1)

Place- Kolhapur,

Date- / / 2022.

ACKNOWLEDGEMENT

It is precious moment for me to acknowledge individuals who helped me during project.

We thankful to Dr. V.R. Ghorpade principal of my college for her encouragement and motivation.

We also thankful to my guide Miss .G.S. Ghorpade for her valuable guidance, continuous encouragement and dynamic support during completion of the project.

INTRODUCTION TO ENVIRONMENT:

The Environment is our basic life support system and is composed of living beings, physical surroundings, and climatic conditions. It is derived from a French word, "Environner", which means "to surround". The term environment includes all biotic and abiotic entities around us. Biotic refers to the world of living organisms, whereas Abiotic refers to the world of non- living elements. The Environment provides us the basic elements – air, water, food, and land which are essential for life to flourish on the Earth.

Our Environment comprises of three components – natural components (air, water, land & living things), human components (individual, family, community), and human-made components (roads, monuments, industries), and is a combination of natural and human- made phenomena.

Environment plays an important role in healthy living and the existence of life on planet earth. Earth is a home for different living species and we all are dependent on the environment for food, air, water, and other needs. Therefore, it is important for every individual to save and protect our environment.

There are different types of human activities which are directly attributed to the environmental disasters, which include- acid rain, acidification of oceans, change in the climate, deforestation, depletion of an ozone layer, disposal of hazardous wastes, global warming, overpopulation, pollution, etc.

WATER

Water covers about 71% of the Earth's surface, mostly in seas and oceans (about 96.5%). Small portions of water occur as groundwater (1.7%), in the glaciers and the ice caps of Antarctica and Greenland (1.7%), and in the air as vapor, clouds (consisting of ice and liquid water suspended in air), and precipitation (0.001%). Water moves continually through the water cycle of evaporation, transpiration (evapotranspiration), condensation, precipitation, and runoff, usually reaching the sea.

Water plays an important role in the world economy. Approximately 70% of the freshwater used by humans goes to agriculture. Fishing in salt and fresh water bodies is a major source of food for many parts of the world, providing 6.5% of global protein. Much of the long-distance trade of commodities (such as oil, natural gas, and manufactured products) is transported by boats through seas, rivers, lakes, and canals.

Large quantities of water, ice, and steam are used for cooling and heating, in industry and homes. Water is an excellent solvent for a wide variety of substances both mineral and organic; as such it is widely used in industrial processes, and in cooking and washing. Water, ice and snow are also central to many sports and other forms of entertainment, such as swimming, pleasure boating, boat racing, surfing, sports.

OBJECTIVES

AIM: -

- To study water ecosystem.
- Understand the extreme complexity of providing water to society.
- To study the process of water treatment.
- To study the collection system.
- To study the methods of water Purifications.
- To study the benefits of Purification of water.
- To study the need of water Purification.
- To study the importance of water.

Observation

- **Importance of water**

Water helps in the regulation of climate in the atmosphere. A lot of the species on Earth exist inside water. Water plays an important role in the food digestion process. Water is also used to produce electricity.

- **Methods of Water Purification-**

Water purification means the process of removing undesirable chemicals, biological contaminants, suspended solids, and gases from water. The goal is to produce water that is fit for specific purposes. Most water is purified and disinfected for human consumption (drinking water), but water purification may also be carried out for a variety of other purposes, including medical, pharmacological, chemical, and industrial applications. The history of water purification includes a wide variety of methods. The methods used include physical processes such as filtration, sedimentation, and distillation; biological processes such as slow sand filters or biologically active carbon; chemical processes such as flocculation and chlorination.

- It is a gravity type rapid sand filter plant.

CONTENTS:

1.STEPS

- >COLLECTION
- >COAGULATION
- >FLASH MIXING
- >FLOCCULATION
- >SEDIMENTATION >FILTRATION
- >BACKWASHING
- >DISINFECTION
- >RESERVOIR

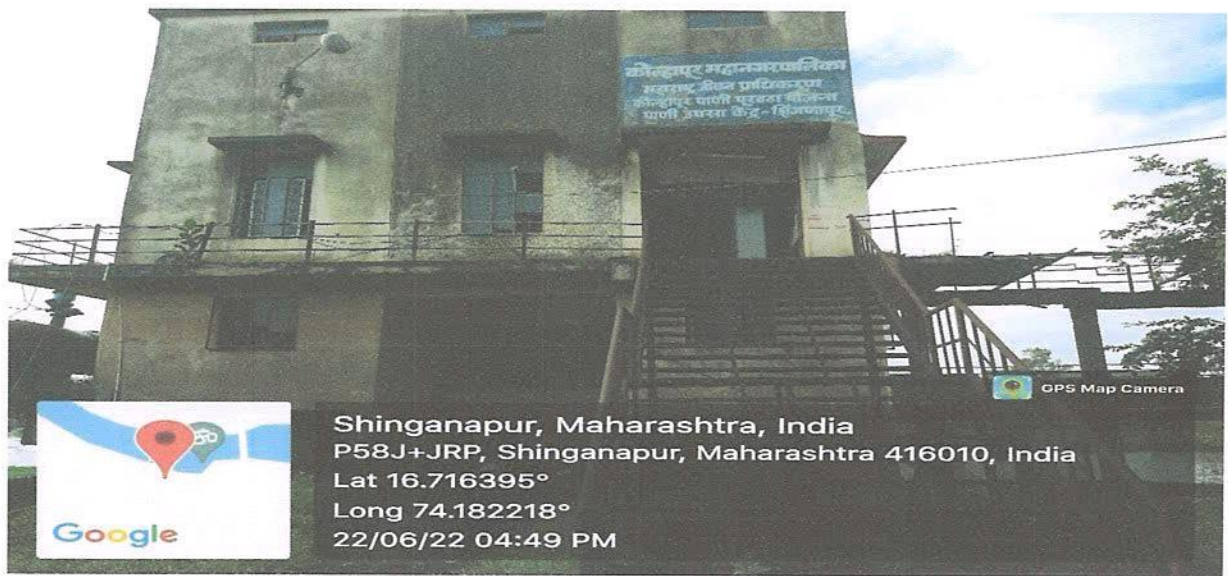


STEPS FOR PURIFICATION ON LARGE SCALE:

STEP 1. COLLECTION:

The raw water which is supplied to the water treatment plant comes from various small and big streams of river from PANCHGANGA.

Shinganapur pumping station, Kolhapur



Step 2. COAGULATION:

The raw water is first treated with chemical coagulant alum was in the range of 5-40mg/L of water.

The dose of alum varies depending upon the turbidity, color, temperature and pH of the water.



Step 3. FLASH MIXING:

Treated water is then subjected to violent agitation in a "mixing chamber" for a few minutes. This allows quick and rapid dissemination of alum throughout the bulk of the water



Step 4. FLOCCULATION:

This phase involves a slow and gentle stirring of the treated water in a flocculation chamber.

The mechanized type of rotor is most commonly used. It consists of a number of paddles which rotates at 2-4 rpm.

This slow and gentle stirring causes the formation of thick copious white flocculent precipitate of Aluminium Hydroxide.

The thicker the precipitate is, the higher is the settling velocity. The superficial layer of water is now removed along with the flocculent material.

Observation: Here we are explained about flocculation- a slow and gentle stirring of treated water in a flocculation chamber for about 30 mins



Step 5. SEDIMENTATION:

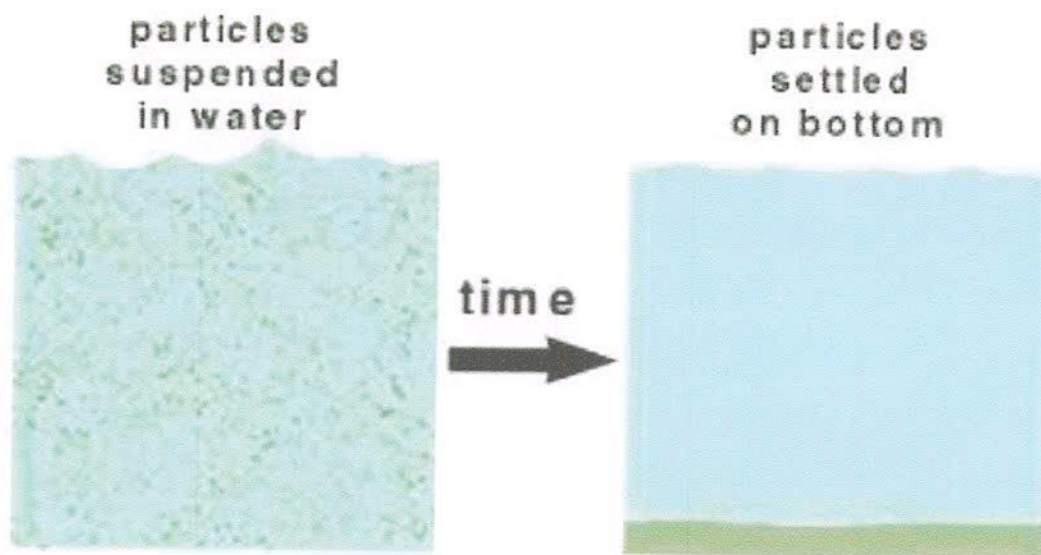
The coagulated water is now lead into sedimentation tank where it is detained for 2-6 hrs when the flocculent precipitate together with impurities and bacteria settle down in the tank.

At least 95% of the flocculent precipitate needs to be removed from the water before it is admitted to the rapid filters.

The sludge or precipitate id removed from the bottom of the tank without disturbing the operation of the tank.

Observation :

We were explained that the plant consist of three sedimentation tank, depth 3.5m. The coagulated water is now lead into sedimentation tank where it is detained for 150 mins



Step 6. FILTRATION:

Each filter unit has 4 sand beds - filter sand, coarse sand, fine gravel, coarse gravel. The thickness of sand bed is 1m.

- The effective size of sand particle is 0.4-0.7mm. - Below the sand bed, a layer of graded gravel of 30 40 cm.

The depth of the water on the top of the sand bed is 5-6 feet.

The under drains at the bottom of the filter bed collect the filter water. The rate of filtration is 5-15 cu m/sq m/hr. The alum floc forms a slimy layer which absorbs bacteria from the water and effects purification of water.

This alum floc is not removed by sedimentation and is held back on the sand bed. Oxidation of ammonia also takes place during the passage of water through filters.



Loss of head-sand filters getting dirty and beginning to lose efficiency approaching 7-8 feet needing backwashing.

Observation :

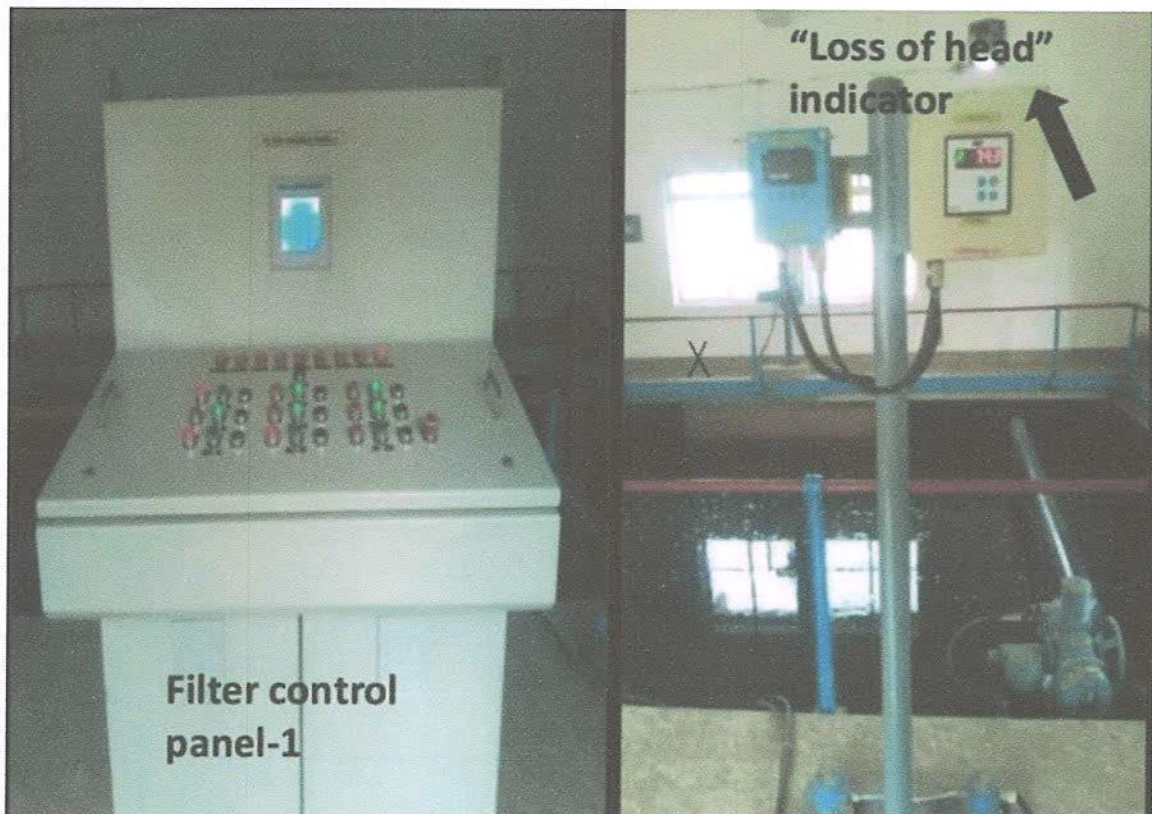
The plant consists of 7(twin section) rapid sand filter beds. Each unit of filter bed has a surface of 900 sq feet and each section is 5.85 4.35m.

Capacity is 244cu/hr.

The filter is gravity type (Paterson's type).

The layers of sand filter are :

1. Supernatant water:- 5-6 feet thick.
2. Sand bed:- 1.2 m thick (fine and coarse sand).
3. Gravel support:-0.30m (fine and coarse gravel).
4. Filter bottom: 0.16m



Step 7. BACKWASHING:

As filter proceeds, the suspended impurities and bacteria clog the filters. The filter soon becomes dirty and begin to lose their efficiency.

When this "loss of head" approaches 7-8 feet, filtration is stopped and filter beds are subjected to backwashing. This is done by reversing the flow of water through the sand bed.

It dislodges the impurities and cleans up the sand bed. Washing is stopped when clear sand is visible and the wash water is sufficiently clean.

It takes about 15 mins.

Observation:

- The backwashing is done twice daily at 8am and 5pm



Step 8. DISINFECTION:

This is the last step before the storage and distribution of this water.

The process used is CHLORINATION.

The chlorine gas is used for effective disinfection.

Principles of chlorination:

1. Water should be free from turbidity.
2. Chlorine demand should be estimated.
3. Contact period.
4. Minimum recommended concentration of free chlorine is 0.5mg/L for 1 hour.
5. The chlorine demand of water is the difference between the amount of chlorine added to the water and the amount of residual chlorine remaining at the end of treatment (after 1hr). The residual chlorine concentrations 0.5mg/L for 1hr.

Action of chlorine: when Chlorine is added to the water there is a formation of hydrochloric acid and hypochlorous acid. The disinfecting action of chlorine is due to hypochlorous acid.



Step 9. RESERVOIR:

We have visited the reservoir where the purified water was stored. From there it was supplied to the various parts of Kolhapur.



Testing Lab:

Here we saw the raw coming from PANCHGANGA River which was then mixed with alum and lime.

Chemical coagulants are added in either two ways:

1. Alum -21mg/liter, and lime -6mg/kg

2. PAC

(Polyaluminium chloride) -4mg/k

बावडा जलशुद्धीकरण केंद्र, को. म. न. पा. कोल्हापूर				
वार: मंगळवार 29/08/2022				
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WHAT WE LEARN?

On 20th June, 2022 at 10.30 am I'm reached
at water treatment plant, K. Bawada .

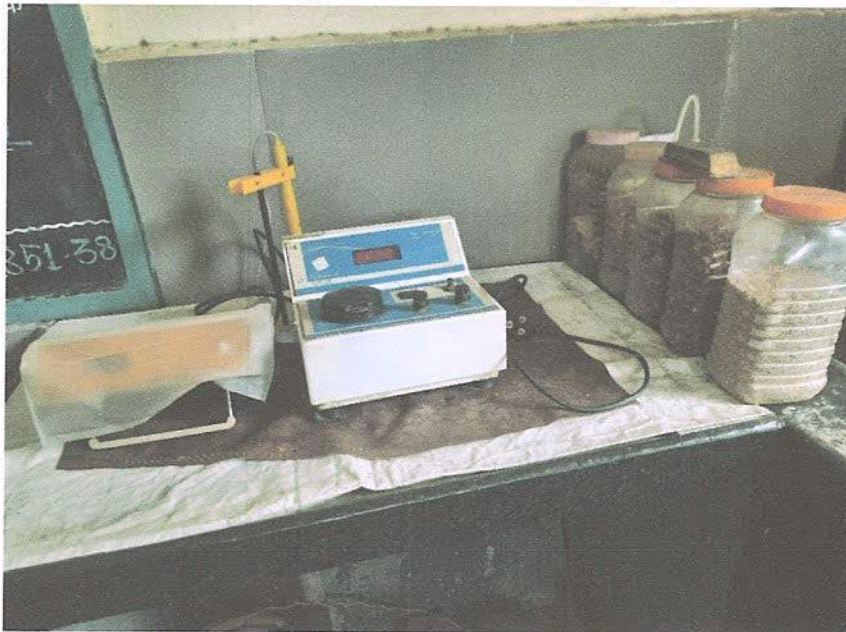
At starting Head of The Plant gave the basic knowledge about treatment process, they explain to us about that before arriving at your field, water is treated at the Water Treatment Plant to remove sediment, bacteria, and other impurities. explained the process from the first step,

Water Sources

Water from the Panchaganga (shingnapur Pumping Station) River flows through 914mm to 711 mm diameter pipe to K. Bawada Water Purification Plant.

Rapid Mixing

Once it arrives at the plant, the pH is adjusted and water is rapidly mixed with aluminum sulfate (alum), a coagulant that helps the impurities stick together to form bigger particles called floc.



World Environment Program Organized At Bharati Vidyapeeth Kolhapur



REFERENCE

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- www.esakal.com
- Times of India