

**"Education for Knowledge, Science and Culture"**

**-Shikshanmaharshi Dr. Bapuji Salunkhe**

Shri Swami Vivekanand Shikshan Sanstha's  
**VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)**  
**Department Of Microbiology**

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**Value Added Course**  
**"Waste Water Management"**



**Academic Year: 2022-2023**

"Education for Knowledge, Science and Culture"

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Shri Swami Vivekanand Shikhan Sanstha's

**VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS),**

**Department of Microbiology**

**Value Added Course (2022-2023)**

**Name of the course – "Microbial Quality Control in Pharmaceutical Industries"**

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(स्वायत्त) कोल्हापूर

“ Education For Knowledge, Science and Culture”

Dr.Bapuji Salunkhe



Shri Swami Vivekanand Shikshan Sanstha's

**Vivekanand College, Kolhapur ( Autonomous)**

Department of Microbiology

Value Added Course

“Waste Water Management”



Course outcome :

After completion of the course, students will be able to :

- Apply practical knowledge for treatment of waste water
- Explain Various tests used for determination of characteristics of waste water
- Predict the impact of water pollution on all life forms .

Fees Rs. 500

Admission Open

Contact us

9822376171,9970191188

7729020896 ,7507611308



Department of Microbiology  
Vivekanand College, Kolhapur  
(Autonomous)  
Date: 21/09/2022

To,  
The Principal,  
Vivekanand College, Kolhapur

Subject: Regarding the commencement of value added course.

Respected Sir,

As per above subject, the department of Microbiology is going to start the value added course "Waste water Management", during the academic year 2022-2023. So, kindly grant the permission for the same.

Thanking you.

Yours faithfully

*Gitar*

Dr.G.K. Sontakke  
Head/Co-ordinator  
Department of Microbiology  
Vivekanand College, Kolhapur

*P.1*  
*21/9/2022*

*Allowed*

*PS*  
*21.9.22*





"Education for Knowledge, Science and Culture"

Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanad Shikshan Sanstha's

**VIVEKANAND COLLEGE, KOLHAPUR**  
**[AUTONOMOUS]**

**Department of Microbiology**

**NOTICE**

**Date:** 20/09/2022

All the students of B.Sc. part I, II and III are hereby informed that, the admissions for the Value added course "Waste Water Management", Dept. of Microbiology, has been started. All the interested students should contact the department of Microbiology.

Registration Fee - 500 Rs.



Dr. G. K. Sontakke  
Coordinator

Department of Microbiology



**Vivekanand College, Kolhapur (Autonomous)**  
**List of Head of the Departments -2022-23**

Sr.No.	Department	Name of HoD	Sign.
1	Marathi	Dr. <del>P.V. Patil</del> E. B. Alwekar	<i>[Signature]</i>
2	Hindi	Dr. A. S. Mahat	<i>[Signature]</i>
3	English	Dr. Mrs. K D Tiwade	<i>[Signature]</i>
4	History	Dr. S. R. Kattimani	<i>[Signature]</i>
5	Geography	Dr. .G.S.Ubale	<i>[Signature]</i>
6	Sociology	Mr .H. V. Chame	<i>[Signature]</i>
7	Economics	Mr. Dr. Kailas Patil	<i>[Signature]</i>
8	Political Sc.	Ms. S A Farakate	<i>[Signature]</i>
9	Home Sc.	Mrs U. S. Khot	<i>[Signature]</i>
10	Commerce	Mr. Sunny Kale	<i>[Signature]</i>
11	Physics	Dr. M M Karanjkar	<i>[Signature]</i>
12	Chemistry	Dr. Mrs. S.D. Shirke	<i>[Signature]</i>
13	Mathematics	Mr. S. P. Patankar	<i>[Signature]</i>
14	Statistics	Ms. Varsha Pawar	<i>[Signature]</i>
15	Electronics	Dr. C. B. Patil	<i>[Signature]</i>
16	Computer Sc.	Dr. V.B. Waghmare	<i>[Signature]</i>
17	Botany	Dr. B.T. Dangat	<i>[Signature]</i>
18	Zoology	Dr. G. K. Sontakke	<i>[Signature]</i>
19	Microbiology	Dr. G. K. Sontakke	<i>[Signature]</i>
20	Bio Technology (Entire & Optional)	Mr. S. G. Kulkarni Ms .S. H. Nadaf	<i>[Signature]</i> 21/9/2022
21	BBA	Mr. Sunny Kale / Dr R. R. Patil	<i>[Signature]</i>
22	BCA	Mr. Sunny Kale / Mrs. V. B. Pujari	<i>[Signature]</i>
23	BCS	Mrs. P. M. Desai	<i>[Signature]</i>
24	B.Voc. & Community College	Dr . S. M .Joshi	<i>[Signature]</i>



**VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)**

**Department of Microbiology**

**Value Added Course**

**2022-23**

**“Waste Water Management”**

**NOTICE**

All the students of value added course “Waste water management”, Department of Microbiology are hereby informed that the lectures and practical’s will be conducted from 3<sup>rd</sup> Oct., 2023.

*Gita*

Incharge Head  
Department Of Microbiology  
Vivekanand Collage, Kolhapur  
(Autonomous)





**Vivekanand College (Autonomous), Kolhapur**  
**Department of Microbiology**  
**Value added course 2022-2023**  
**“Waste Water Management”**

Sr. No.	Name of student	Class
1	Miss. Sanika Vishnu Chougale	B. Sc. I
2	Miss. Sakshi Satappa Patil	B. Sc. I
3	Miss. Avantika Arun Patil	B. Sc. I
4	Miss. Vaishnavi Jitendra Khot	B. Sc. I
5	Miss. Aishwarya Maruti Angaj	B. Sc. II
6	Miss. Vaishnavi Vivek Chandala	B. Sc. II
7	Miss. Shukrani C. Kandalkar	B. Sc. II
8	Miss. Dhanashri Raju Balekundri	B. Sc. II
9	Miss. Arpita Shivaji Patil	B. Sc. II
10	Miss. Sharayu Pradeep Bhosale	B. Sc. II
11	Miss. Rushita Dinkar Powar	B. Sc. II
12	Miss. Galaxy Sunil Pawar	B. Sc. II
13	Miss. Shriya Prakash Lole	B. Sc. II
14	Miss. Arpita Sachin Hawal	B. Sc. II
15	Miss. Swarupa Prasad Khairmode	B. Sc. II
16	Miss. Snehal Babaso Kashid	B. Sc. II
17	Miss. Shivani Vinayak Gurav	B. Sc. II
18	Miss. Asavari Anil Kalamkar	B. Sc. II
19	Miss. Namrata Anil Kandalkar	B. Sc. II
20	Miss. Sanovar Salim Mulla	B. Sc. II
21	Miss. Darnini Mohan Padaval	B. Sc. II
22	Miss. Harshada Pradip Khot	B. Sc. II
23	Miss. Smita Lakshman Patil	B. Sc. II
24	Miss. Ankita Chotelal Sahani	B. Sc. II
25	Miss. Prachi Chndrakant Kesarkar	B. Sc. II
26	Miss. Pallavi Ravindra Hande	B. Sc. II
27	Miss. Sakshi Deepak Koli	B. Sc. II





28	Mr. Atharva Ramdas Gurav	B. Sc. II
29	Mr. Rahul Gautam Malavi	B. Sc. II
30	Mr. Rohan Ravindra Sawant	B. Sc. II
31	Miss. Pranali Shivaji Vharamble	B. Sc. II
32	Miss. Shrutika Manik Pardeshi	B. Sc. II
33	Miss. Gayatri Gajanan Patil	B. Sc. II
34	Miss. Sanika Prakash Thorbole	B. Sc. II
35	Miss. Sanika Sagar Chavan	B. Sc. II
36	Miss. Sanika Shital Patil	B. Sc. II
37	Miss. Sanika Sanjay Patil	B. Sc. II
38	Miss. Pooja Amar Patil	B. Sc. II
39	Mr. Kedar Santosh Sutar	B. Sc. II
40	Miss. Sayma Rashid Tamboli	B. Sc. III
41	Mr. Pankaj Sunil Zirange	B. Sc. II Biotechnology
42	Mr. Suraj Santosh Kadam	B. Sc. II Biotechnology
43	Mr. Mohit Sunil Mane	B. Sc. II Biotechnology
44	Mr. Fardin Mahamadhanif Makandar	B. Sc. II Biotechnology

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 Shri Swami Vivekanand Shikshan Sanstha's  
**VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)**  
**Department of Microbiology**  
**Value Added Course**  
**2022-2023**  
**“Waste water management”**

Sr. No.	Heading	Particulars
1	Title of the Course	Industrial Pollution control and waste treatment technology
2	Eligibility for Admission	Candidate who passed 10+2 examination with at least 45% marks in aggregate in Arts/ Commerce/ Science
3	Passing Marks for the course	The candidate must obtain 35 % of the total marks in theory and practical separately to pass the course.
4	Level	Value Added
5	Pattern	Trimester
6	Intake Capacity	40
7	Fees	Rs. 500/-
8	Job opportunities	Sugar industry , Dairy industry ETP, Government and Private sectors
9	To be implemented from the Academic Year	From Academic Year -2022-23
10	Course Co-ordinator	Mr.S.D.Gabale (9970191188)

The present add on course is framed to give sound knowledge with understanding of industrial sector pollution problems and waste water treatment technologies to the student. The goal of the syllabus is to implement career oriented education and skills to student interested in directly entering the industrial workforce.



## OBJECTIVES OF THE COURSE –

- 1) To develop skills required in various industries, research labs and in the field of human health.
- 2) To prepare the students to accept the challenges in industrial sectors.
- 3) To promote understanding of basic and advanced concepts in industrial waste water treatment technologies.
- 4) To make the student knowledgeable with respect to the basic and advanced concepts in industries and in research field.

## COURSE OUTCOME:

After completion of the course, student will be able to:

1. Apply practical knowledge for treatment of waste water.
2. Explain various tests used for determination of characteristics of waste water.
3. Predict the impact of water pollution on all life forms.

**Title of the course: Waste water management**

**Total Lectures: 40**

**Total Marks: 100**

Course	Unit	Topic	L/Unit
Add-on (Semester)	I	Fundamentals of Environmental pollution	13
	II	Bioremediation	13
	III	Waste water Treatment Technologies	14

## OBJECTIVES OF THE COURSE –

- 1) To develop skills required in various industries, research labs and in the field of human health.
- 2) To prepare the students to accept the challenges in industrial sectors.
- 3) To promote understanding of basic and advanced concepts in industrial waste water treatment technologies.
- 4) To make the student knowledgeable with respect to the basic and advanced concepts in industries and in research field.

## COURSE OUTCOME:

After completion of the course, student will be able to:

1. Apply practical knowledge for treatment of waste water.
2. Explain various tests used for determination of characteristics of waste water.
3. Predict the impact of water pollution on all life forms.
4. Understand role of microorganisms in water pollution

**Title of the course: Waste water management**

**Total Lectures: 40**

**Total Marks: 100**

Course	Unit	Topic	L/Unit
Add-on (Semester)	I	Fundamentals of Environmental pollution	13
	II	Bioremediation	13
	III	Waste water Treatment Technologies	14



## UNIT-I

## Basics of Environmental sciences

- Definition and meaning of terms – Pollution, Atmosphere, Gaseous emission, climate change, composting, ecosystem, effluent, Environment.
- Environmental pollution- source, courses and effect of – Soil pollution, Water pollution, Air pollution, noise pollution.
- Meaning of some important terminologies-  
Global warming, Acid rain, Algal bloom, Carbon foot printing, Green house effect, Hazardous gases, oil spills, Ozone depletion, radioactive waste.
- Physical and chemical characters of waste-  
Liquid waste-pH, electrical conductivity, COD, BOD, total solid, total dissolved solids, total volatile solids, total suspended solids, chlorides, sulphates, oils & grease.  
Solid waste-pH, electrical conductivity, total volatile solids ash
- Name's, rules and regulations of CPCB & MPCB

## UNIT-II

## Lecture 15

## Bioremediation

- Concepts in Bioremediation  
Contaminant, xenobiotic, bioaccumulation, biomagnifications, bioaugmentation, consortium, phytoaccumulation, phytoextraction, recalcitration, biotransformation.
- Xenobiotics- concepts, persistence & biomagnifications of xenobiotic molecules. Use of microbes and plants in biodegradation and biotransformation.
- Concept and types of biodegradation.
- Water pollution monitoring-  
Biological methods- DO, BOD, SPC.  
Chemical methods- COD, pH, TSS, TDS, TS, TVS.



## UNIT-III

**Waste Water Treatment Technology**

- Important terminologies in waste treatments systems-  
Sludge, aerobic treatment, anaerobic treatment, bioengineering, biosolids, clarifiers.
- Waste water treatment systems  
Primary, secondary & tertiary treatment methods.
- management of hazardous waste .
- Use of microbial system, root zone technology, reclamation of wasteland, biogas.
- Sludge disposal-  
Effect of sludge on environment, methods of sludge disposal.

**Books recommended:**

- 1) Advances in biotechnological Process; MMizrahi & Wezel.
- 2) Biodegradation and Bioremediation. Academic Press; 2<sup>nd</sup> edition, Martin Alexander.
- 3) Milton Wainwright. An Introduction to Environmental Biotechnology, Kluwer.

**Practical's**

Hours 100

Sr. No.	Particulars
1.	Study of Compound microscope
2.	Study of Lab equipments
3.	Determination of physical parameters of waste water- Temperature, color, odor, pH
4.	Determination of total dissolved solids.
5.	Detection of E.C. of wastewater
6.	Determination of cHardness
7.	Determination of alkalinity of wastewater
8.	Determination of DO of waste water
9.	Determination of BOD
10.	Determination of COD
11.	Determination of oil & grease from waste
12.	Determination of SPC of different waste
13.	Preparation of cultural media and its sterilization
14.	Determination of fecal contamination of water – Qualitative & Quantitative estimation.
15.	Determination of chloride content of water

## Assessment:

### Term End Theory Assessment –100 marks

1. Duration - These examinations shall be of three hours duration.
2. Theory question paper pattern:-
  - a. There shall be 20 multiple choice questions each of 1 mark. Five multiple choice questions from each unit.
  - b. There shall be four major questions one from each unit. All questions shall be compulsory with internal choice within the questions. Each question will be of 40 marks with options.
  - c. Questions may be sub divided into sub questions a, b, c & d only, each carrying 10 marks and allocation of marks depends on the weightage of the topic.

## Practical Examination Pattern: Annual

Sr. No.	Particulars	Marks
1.	Laboratory work	30
2.	Journal	10
3.	Viva Voce	10

### Field visits-

- Visit to ETP of Sugar industries
- Visit to ETP of Dairy industries
- Visit to ETP of distillery industries
- Visit to sewage treatment plant

### Books recommended for practical:

- 1) APHA (American Public Health Association) Handbook, 1998
- 2) Soil, Plant, Water analysis- P.C. Jaiswal
- 3) Chemical and biological analysis of water- Dr. R. K. Trivedi and P.K. Goel
- 4) Practical Biochemistry- J. Jayaraman





**VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR**  
**Department of Microbiology**  
**Value added course (2021-22)**  
**Name of the course – “Industrial waste water management”**  
**Syllabus Distribution**

Unit	Topic	No. of Lectures	Name of the Teacher
I	Basics of environmental sciences	15	Ms. T. K. Ulhalkar
II	Bioremediation	15	Ms. S.A.Pise
III	Waste water treatment technology	15	Ms.V.V.Misal
IV	<b>Practicals</b>		
	1. Study of Compound Microscope		Ms. V. V. Misal
	2. Study of Lab equipments		Ms. S. A. Pise
	3. Determination of oil and grease content of water		Mr. A. T. Mane
	4. Determination of physical parameters of waste water- Temperature, color, odor, pH		Mr. S. D. Gabale
	5. Preparation of cultural media and its sterilization		Mr. S. D. Gabale
	6. Determination of fecal contamination of water – Qualitative & Quantitative estimation.		Mr. S. D. Gabale
	7. Determination of Biological oxygen demand		Mr. S. D. Gabale
	8. Determination of Chemical oxygen demand		Mr. S. D. Gabale
	9. Determination of most probable number		Ms. S. D. Gabale
	10. Determination of standard plate count		Mr. S. D. Gabale
	11. Determination of total dissolved solids		Mr. S. D. Gabale
	12. Alkalinity of water		Mr. S. D. Gabale
	13. Electric conductivity of water		Mr. A. T. Mane
	14. Hardness of water		Mr. A. T. Mane



*Gita*  
 Incharge Head  
 Department Of Microbiology  
 Vivekanand College, Kolhapur  
 (Autonomous)



**VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR**

**Department of Microbiology**

**Add On Course 2022-2023**

**Name of the course – “Waste water management”**

**TIME-TABLE**

<b>Time</b>	<b>Monday</b>	<b>Tuesday</b>
<b>9.00am to 10.00am</b>	<b>VVM/SAP</b>	<b>TKU/SDG</b>
<b>10.00am to 11.00am</b>	<b>VVM/SAP</b>	<b>TKU/SDG</b>



*Guta*  
incharge Head  
Department Of Microbiology  
Vivekanand College, Kolhapur.  
(Autonomous)

**Vivekanand college (Autonomous), Kolhapur**  
**Department of Microbiology**  
**Value added course 2022-2023**  
**"Waste Water Management"**

Sr. No.	Name of student	11-10	14-10	15-10-22	20-10	21-10	22-10	11-11 2022	19-11	20-11	21-11
1	Miss. Sanika Vishnu Chougule	S.V.C	S.V.C	A	S.V.C	A	S.V.C	S.V.C	S.V.C	S.V.C	S.V.C
2	Miss. Sakshi Satappa Patil	A	A	A	A	A	A	A	A	A	A
3	Miss. Avantika Arun Patil	A	A	AAP	AAP	AAP	AAP	AAP	AAP	AAP	A
4	Miss. Vaishnavi Jitendra Khot	A	A	A	A	A	A	A	A	A	A
5	Miss. Aishwarya Maruti Angaj	A	A	A	A	A	A	A	A	A	A
6	Miss. Vaishnavi Vivek Chandala	A	A	A	A	A	A	A	A	A	A
7	Miss. Shukrani C. Kandalkar	A	A	A	A	A	A	A	A	A	A
8	Miss. Dhanashri Raju Balekundri	A	A	A	A	A	A	A	A	A	A
9	Miss. Arpita Shivaji Patil	A	A	A	A	A	A	A	A	A	A
10	Miss. Sharayu Pradeep Bhosale	A	A	A	A	A	A	A	A	A	A
11	Miss. Rushita Dinkar Powar	A	A	A	A	A	A	A	A	A	A
12	Miss. Galaxy sunil pawar	A	A	A	A	A	A	A	A	A	A
13	Miss. Shriya Prakash Lole	A	A	A	A	A	A	A	A	A	A
14	Miss. Arpita Sachin Hawal	A	A	A	A	A	A	A	A	A	A
15	Miss. Swarupa Prasad Khairmode	A	A	A	A	A	A	A	A	A	A
16	Miss. Snehal Babaso Kashid	A	A	A	A	A	A	A	A	A	A
17	Miss. Shivani Vinayak Gurav	A	A	A	A	A	A	A	A	A	A
18	Miss. Asavari Anil Kalamkar	A	A	A	A	A	A	A	A	A	A
19	Miss. Namrata Anil Kandalkar	A	A	A	A	A	A	A	A	A	A
20	Miss. Sanovar Salim Mulla	A	A	A	A	A	A	A	A	A	A
21	Miss. Damini Mohan Padaval	A	A	A	A	A	A	A	A	A	A
22	Miss. Harshada Pradip Khot	A	A	A	A	A	A	A	A	A	A
23	Miss. Smita Lakshman Patil	A	A	A	A	A	A	A	A	A	A
24	Miss. Ankita Chotelal Sahani	A	A	A	A	A	A	A	A	A	A
25	Miss. Prachi Chndarkant Kesarkar	A	A	A	A	A	A	A	A	A	A
26	Miss. Pallavi Ravindra Hande	A	A	A	A	A	A	A	A	A	A
27	Miss. Sakshi Deepak Koli	A	A	A	A	A	A	A	A	A	A
28	Mr. Atharvva Ramdas Gurav	A	A	A	A	A	A	A	A	A	A
29	Mr. Rahul Gautam Malavi	A	A	A	A	A	A	A	A	A	A
30	Mr. Rohan Ravindra Sawant	A	A	A	A	A	A	A	A	A	A
31	Miss. Pranali Shivaji Vharamble	A	A	A	A	A	A	A	A	A	A
32	Miss. Shrutika Manik Pardeshi	A	A	A	A	A	A	A	A	A	A
33	Miss. Gayatri Gajanan Patil	A	A	A	A	A	A	A	A	A	A
34	Miss. Sanika Prakah Thorbole	A	A	A	A	A	A	A	A	A	A
35	Miss. Sanika Sagar Chavan	A	A	A	A	A	A	A	A	A	A
36	Miss. Sanika Shital Patil	A	A	A	A	A	A	A	A	A	A
37	Miss. Sanika Sanjay Patil	A	A	A	A	A	A	A	A	A	A
38	Miss. Pooja Amar Patil	A	A	A	A	A	A	A	A	A	A
39	Mr. Kedar Santosh Sutar	A	A	A	A	A	A	A	A	A	A





40	Miss. Sayma Rashid Tamboli	A			A							
41	Mr. Pankaj Sunil Zirange	Zirange	Zirange	Zirange	Zirange	Zirange	Zirange	Zirange	A	A	A	
42	Mr. Suraj Santosh Kadam	(S)	(S)	(S)	(S)	(S)	(S)	(S)	A	A	A	
43	Mr. Mohit Sunil Mane	Mhane	Mhane	Mhane	Mhane	Mhane	Mhane	Mhane	A	A	A	
44	Mr. Fardin Mahamadhanif Makandar	Fardis	Fardis	Fardis	Fardis	Fardis	Fardis	Fardis	A	A	A	

**Vivekanand college (Autonomous), Kolhapur**  
**Department of Microbiology**  
**Value added course 2021-2022**  
**"Waste Water Management"**

Sr. No.	Name of student	02/11	16/11	17/11	18/11									
1	Miss. Sanika Vishnu Chougale	S.V.C	S.V.C	Ab	Ab									
2	Miss. Sakshi Satappa Patil	Sakshi	Ab	Ab	Ab									
3	Miss. Avantika Arun Patil	Avantika	Ab	Ab	Ab									
4	Miss. Vaishnavi Jitendra Khot	Ab	Ab	Xkhat	Xkhat									
5	Miss. Aishwarya Maruti Angaj	Amayya	Amayya	Ab	Ab									
6	Miss. Vaishnavi Vivek Chandala	Abhaya	Abhaya	Ab	Ab									
7	Miss. Shukrani C. Kandalakar	Sankar	Sankar	Ab	Ab									
8	Miss. Dhanashri Raju Balekundri	Ab	Ab	Ab	Ab									
9	Miss. Arpita Shivaji Patil	Arpita	Arpita	Ab	Ab									
10	Miss. Sharayu Pradeep Bhosale	Sharayu	Sharayu	Ab	Ab									
11	Miss. Rushita Dinkar Powar	Rushita	Rushita	Rushita	Rushita									
12	Miss. Galaxy sunil pawar	Galaxy	Ab	Galaxy	Galaxy									
13	Miss. Shriya Prakash Lole	Shriya	Shriya	Ab	Ab									
14	Miss. Arpita Sachin Hawal	Ab	Arpita	Arpita	Arpita									
15	Miss. Swarupa Prasad Khairmode	Ab	Ab	Ab	Ab									
16	Miss. Snehal Babaso Kashid	Snehal	Snehal	Snehal	Snehal									
17	Miss. Shivani Vinayak Gurav	Ab	Shivani	Ab	Ab									
18	Miss. Asavari Anil Kalamkar	Asavari	Asavari	Ab	Ab									
19	Miss. Namrata Anil Kandalakar	Namrata	Namrata	Namrata	Namrata									
20	Miss. Sanovar Salim Mulla	Sanovar	Sanovar	Sanovar	Sanovar									
21	Miss. Damini Mohan Padaval	Damini	Damini	Ab	Ab									
22	Miss. Harshada Pradip Khot	Ab	Ab	Ab	Ab									
23	Miss. Smita Lakshman Patil	Smita	Smita	Smita	Smita									
24	Miss. Ankita Chotelal Sahani	Ankita	Ankita	Ankita	Ankita									
25	Miss. Prachi Chndarkant Kesarkar	Ab	Prachi	Prachi	Prachi									
26	Miss. Pallavi Ravindra Hande	Pallavi	Pallavi	Ab	Ab									
27	Miss. Sakshi Deepak Koli	Sakshi	Sakshi	Sakshi	Sakshi									
28	Mr. Atharvva Ramdas Gurav	Ab	Ab	Ab	Ab									
29	Mr. Rahul Gautam Malavi	Ab	Ab	Rahul	Rahul									
30	Mr. Rohan Ravindra Sawant	Ab	Ab	Ab	Ab									
31	Miss. Pranali Shivaji Vharamble	Pranali	Pranali	Pranali	Pranali									
32	Miss. Shrutika Manik Pardeshi	Shrutika	Shrutika	Ab	Ab									
33	Miss. Gayatri Gajanan Patil	Ab	Ab	Ab	Ab									
34	Miss. Sanika Prakah Thorbole	Sanika	Sanika	Ab	Ab									
35	Miss. Sanika Sagar Chavan	Ab	Sanika	Sanika	Sanika									
36	Miss. Sanika Shital Patil	Ab	Ab	Ab	Ab									
37	Miss. Sanika Sanjay Patil	Sanika	Ab	Ab	Ab									
38	Miss. Pooja Amar Patil	Ab	Ab	Ab	Ab									
39	Mr. Kedar Santosh Sutar	Ab	Kedar	Ab	Ab									





40	Miss. Sayma Rashid Tamboli	Zaymat	Ab																
41	Mr. Pankaj Sunil Zirange	<del>Zaymat</del>	Ab																
42	Mr. Suraj Santosh Kadam	<del>Zaymat</del>	Ab																
43	Mr. Mohit Sunil Mane	Ab	Ab																
44	Mr. Fardin Mahamadhanif Makandar	Zaymat	Ab																

Vivekanand college (Autonomous), Kolhapur

Department of Microbiology  
Value added course 2021-2022  
"Waste Water Management"

Sr. No.	Name of student	5/10/22	7/10/22	08/10/22						
1	Miss. Sanika Vishnu Chougale	S.V.C	S.V.C	S.V.C						
2	Miss. Sakshi Satappa Patil	A	A	A						
3	Miss. Avantika Arun Patil	Avantika	Avantika	A						
4	Miss. Vaishnavi Jitendra Khot	Vaishnavi	Vaishnavi	A						
5	Miss. Aishwarya Maruti Angaj	Aishwarya	Aishwarya	A						
6	Miss. Vaishnavi Vivek Chandala	Vaishnavi	Vaishnavi	A						
7	Miss. Shukrani C. Kandalkar	Shukrani	Shukrani	Kandalkar						
8	Miss. Dhanashri Raju Balekundri	Dhanashri	Dhanashri	Balekundri						
9	Miss. Arpita Shivaji Patil	Arpita	Arpita	Arpita						
10	Miss. Sharayu Pradeep Bhosale	Sharayu	Sharayu	Bhosale						
11	Miss. Rushita Dinkar Powar	Rushita	Rushita	Powar						
12	Miss. Galaxy sunil pawar	A	A	A						
13	Miss. Shriya Prakash Lole	Shriya	Shriya	A						
14	Miss. Arpita Sachin Hawal	Arpita	Arpita	Hawal						
15	Miss. Swarupa Prasad Khairmode	Swarupa	Swarupa	Khairmode						
16	Miss. Snehal Babaso Kashid	A	A	Kashid						
17	Miss. Shivani Vinayak Gurav	Shivani	Shivani	Vinayak Gurav						
18	Miss. Asavari Anil Kalamkar	Asavari	Asavari	Anil Kalamkar						
19	Miss. Namrata Anil Kandalkar	Namrata	Namrata	Anil Kandalkar						
20	Miss. Sanovar Salim Mulla	Sanovar	Sanovar	Salim Mulla						
21	Miss. Damini Mohan Padaval	Damini	Damini	Mohan Padaval						
22	Miss. Harshada Pradip Khot	Harshada	Harshada	A						
23	Miss. Smita Lakshman Patil	Smita	Smita	Patil						
24	Miss. Ankita Chotelal Sahani	Ankita	Ankita	Chotelal Sahani						
25	Miss. Prachi Chndarkant Kesarkar	Prachi	Prachi	A						
26	Miss. Pallavi Ravindra Hande	Pallavi	Pallavi	Ravindra Hande						
27	Miss. Sakshi Deepak Koli	Sakshi	Sakshi	A						
28	Mr. Atharva Ramdas Gurav	Atharva	Atharva	Ramdas Gurav						
29	Mr. Rahul Gautam Malavi	Rahul	Rahul	Gautam Malavi						
30	Mr. Rohan Ravindra Sawant	Rohan	Rohan	A						
31	Miss. Pranali Shivaji Vharamble	Pranali	Pranali	Shivaji Vharamble						
32	Miss. Shrutika Manik Pardeshi	Shrutika	A	A						
33	Miss. Gayatri Gajanan Patil	Gayatri	A	A						
34	Miss. Sanika Prakah Thorbole	Sanika	A	A						
35	Miss. Sanika Sagar Chavan	Sanika	A	A						
36	Miss. Sanika Shital Patil	A	A	A						
37	Miss. Sanika Sanjay Patil	A	Patil	Patil						
38	Miss. Pooja Amar Patil	Pooja	A	Patil						
39	Mr. Kedar Santosh Sutar	Kedar	A	A						



Handwritten signature or initials.

40	Miss. Sayma Rashid Tamboli																		
41	Mr. Pankaj Sunil Zirange	<i>Pankaj</i>	<i>Pankaj</i>																
42	Mr. Suraj Santosh Kandam	<i>Suraj</i>	<i>Suraj</i>																
43	Mr. Mohit Sunil Mane	<i>Mohit</i>	<i>Mohit</i>																
44	Mr. Fardin Mahamadhanif Makandar																		

water pollution monitoring →



**Vivekanand college (Autonomous), Kolhapur**  
**Department of Microbiology**  
**Value added course 2022-2023**  
**"Waste Water Management"**  
**Practical Attendance**

Sr. No.	Name of student	16/12	17/12	17/12	29/01	2/1/11								
1	Miss. Sanika Vishnu Chougule	S.V.C	S.V.C	S.V.C	A	A								
2	Miss. Sakshi Satappa Patil	A	A	A	A	A								
3	Miss. Avantika Arun Patil	AAP	AAP	AAP	A	A								
4	Miss. Vaishnavi Jitendra Khot	A	A	A	A	A								
5	Miss. Aishwarya Maruti Angaj	Angaj	Angaj	Angaj	Angaj	Angaj								
6	Miss. Vaishnavi Vivek Chandala	Chandala	Chandala	A	Chandala	Chandala								
7	Miss. Shukrani C. Kandalkar	Kandalkar	Kandalkar	Kandalkar	Kandalkar	Kandalkar								
8	Miss. Dhanashri Raju Balekundri	IRB	IRB	IRB	IRB	IRB								
9	Miss. Arpita Shivaji Patil	Arpita	Arpita	Arpita	A	A								
10	Miss. Sharayu Pradeep Bhosale	Bhosale	Bhosale	Bhosale	Bhosale	Bhosale								
11	Miss. Rushita Dinkar Powar	Powar	Powar	Powar	Powar	Powar								
12	Miss. Galaxy sunil pawar	A	A	A	A	A								
13	Miss. Shriya Prakash Lole	A	A	A	A	A								
14	Miss. Arpita Sachin Hawal	Hawal	Hawal	Hawal	Hawal	Hawal								
15	Miss. Swarupa Prasad Khairmode	Khairmode	Khairmode	Khairmode	Khairmode	Khairmode								
16	Miss. Snehal Babaso Kashid	SBK	SBK	SBK	SBK	SBK								
17	Miss. Shivani Vinayak Gurav	Gurav	A	Gurav	Gurav	Gurav								
18	Miss. Asavari Anil Kalamkar	Kalamkar	A	Kalamkar	Kalamkar	Kalamkar								
19	Miss. Namrata Anil Kandalkar	Kandalkar	A	Kandalkar	Kandalkar	Kandalkar								
20	Miss. Sanovar Salim Mulla	Mulla	Mulla	Mulla	Mulla	A								
21	Miss. Damini Mohan Padaval	Padaval	Padaval	Padaval	Padaval	A								
22	Miss. Harshada Pradip Khot	Khot	Khot	Khot	Khot	Khot								
23	Miss. Smita Lakshman Patil	Patil	Patil	Patil	Patil	Patil								
24	Miss. Ankita Chotelal Sahani	Sahani	Sahani	Sahani	Sahani	Sahani								
25	Miss. Prachi Chndarkant Kesarkar	A	Kesarkar	Kesarkar	Kesarkar	Kesarkar								
26	Miss. Pallavi Ravindra Hande	A	Hande	Hande	Hande	Hande								
27	Miss. Sakshi Deepak Koli	Koli	A	Koli	Koli	Koli								
28	Mr. Atharvva Ramdas Gurav	Gurav	Gurav	A	Gurav	Gurav								
29	Mr. Rahul Gautam Malavi	Malavi	Malavi	A	Malavi	Malavi								
30	Mr. Rohan Ravindra Sawant	A	Sawant	A	Sawant	A								
31	Miss. Pranali Shivaji Vharamble	Vharamble	Vharamble	Vharamble	Vharamble	Vharamble								
32	Miss. Shrutika Manik Pardeshi	Pardeshi	Pardeshi	Pardeshi	Pardeshi	Pardeshi								
33	Miss. Gayatri Gajanan Patil	A	A	A	A	A								
34	Miss. Sanika Prakah Thorbole	Thorbole	Thorbole	Thorbole	Thorbole	Thorbole								
35	Miss. Sanika Sagar Chavan	Chavan	Chavan	Chavan	Chavan	Chavan								
36	Miss. Sanika Shital Patil	A	A	Patil	Patil	Patil								
37	Miss. Sanika Sanjay Patil	A	A	Patil	Patil	A								



38	Miss. Pooja Amar Patil					A							
39	Mr. Kedar Santosh Sutar	Kedar	Kedar	Kedar	Kedar	A							
40	Miss. Sayma Rashid Tamboli	A	Saymat	Saymat	Saymat	Saymat							
41	Mr. Pankaj Sunil Zirange	Pankaj	Pankaj	A	A	A							
42	Mr. Suraj Santosh Kadam	Suraj	Suraj	A	A	A							
43	Mr. Mohit Sunil Mane	Mohit	Mohit	A	A	A							
44	Mr. Fardin Mahamadhanif Makandar	Fardin	Fardin	A	A	A							



Vivekanand college (Autonomous), Kolhapur

Department of Microbiology

Value added course 2021-2022

"Waste Water Management"

Practical

Sr. No.	Name of student	10/11	20/11	17/11	17/11	18/11	19/11	19/11	14/12	15/12	15/12
1	Miss. Sanika Vishnu Chougale	Sanika	Sanika	Sanika	Sanika	A	Sanika	A	Sanika	Sanika	A
2	Miss. Sakshi Satappa Patil	A	A	A	A	A	A	A	A	A	A
3	Miss. Avantika Arun Patil	Avantika	Avantika	Avantika	Avantika	A	A	A	A	A	A
4	Miss. Vaishnavi Jitendra Khot	Vaishnavi	Vaishnavi	Vaishnavi	Vaishnavi	A	A	A	Vaishnavi	Vaishnavi	A
5	Miss. Aishwarya Maruti Angaj	Aishwarya	Aishwarya	Aishwarya	Aishwarya	A	A	A	Aishwarya	Aishwarya	Aishwarya
6	Miss. Vaishnavi Vivek Chandala	Vaishnavi	Vaishnavi	Vaishnavi	Vaishnavi	A	A	A	Vaishnavi	Vaishnavi	Vaishnavi
7	Miss. Shukrani C. Kandalkar	Shukrani	Shukrani	Shukrani	Shukrani	A	A	A	Shukrani	Shukrani	Shukrani
8	Miss. Dhanashri Raju Balekundri	Dhanashri	Dhanashri	Dhanashri	Dhanashri	A	A	A	Dhanashri	Dhanashri	Dhanashri
9	Miss. Arpita Shivaji Patil	Arpita	Arpita	Arpita	Arpita	A	A	A	Arpita	Arpita	Arpita
10	Miss. Sharayu Pradeep Bhosale	Sharayu	Sharayu	Sharayu	Sharayu	A	A	A	Sharayu	Sharayu	Sharayu
11	Miss. Rushita Dinkar Powar	Rushita	Rushita	Rushita	Rushita	A	A	A	Rushita	Rushita	Rushita
12	Miss. Galaxy sunil pawar	Galaxy	Galaxy	Galaxy	Galaxy	A	A	A	A	A	A
13	Miss. Shriya Prakash Lole	Shriya	Shriya	Shriya	Shriya	A	A	A	A	A	A
14	Miss. Arpita Sachin Hawal	Arpita	Arpita	Arpita	Arpita	A	A	A	Arpita	Arpita	Arpita
15	Miss. Swarupa Prasad Khairmode	A	A	A	A	A	A	A	A	A	A
16	Miss. Snehal Babaso Kashid	A	A	A	A	A	A	A	A	A	A
17	Miss. Shivani Vinayak Gurav	A	A	A	A	A	A	A	A	A	A
18	Miss. Asavari Anil Kalamkar	Asavari	Asavari	Asavari	Asavari	A	A	A	Asavari	Asavari	Asavari
19	Miss. Namrata Anil Kandalkar	Namrata	Namrata	Namrata	Namrata	A	A	A	A	A	A
20	Miss. Sanovar Salim Mulla	Sanovar	Sanovar	Sanovar	Sanovar	A	A	A	Sanovar	Sanovar	Sanovar
21	Miss. Damini Mohan Padaval	Damini	Damini	Damini	Damini	A	A	A	Damini	Damini	Damini
22	Miss. Harshada Pradip Khot	Harshada	Harshada	Harshada	Harshada	A	A	A	Harshada	Harshada	A
23	Miss. Smita Lakshman Patil	Smita	Smita	Smita	Smita	A	A	A	A	A	Smita
24	Miss. Ankita Chotelal Sahani	Ankita	Ankita	Ankita	Ankita	A	A	A	Ankita	Ankita	Ankita
25	Miss. Prachi Chndarkant Kesarkar	Prachi	Prachi	Prachi	Prachi	A	A	A	Prachi	Prachi	Prachi
26	Miss. Pallavi Ravindra Hande	Pallavi	Pallavi	Pallavi	Pallavi	A	A	A	Pallavi	Pallavi	Pallavi
27	Miss. Sakshi Deepak Koli	Sakshi	Sakshi	Sakshi	Sakshi	A	A	A	Sakshi	Sakshi	Sakshi
28	Mr. Atharvva Ramdas Gurav	Atharvva	Atharvva	Atharvva	Atharvva	A	A	A	Atharvva	Atharvva	Atharvva
29	Mr. Rahul Gautam Malavi	Rahul	Rahul	A	A	Rahul	Rahul	Rahul	Rahul	Rahul	Rahul
30	Mr. Rohan Ravindra Sawant	Rohan	Rohan	A	A	Rohan	Rohan	A	A	A	A
31	Miss. Pranali Shivaji Vharamble	Pranali	Pranali	A	A	Pranali	Pranali	Pranali	Pranali	Pranali	Pranali
32	Miss. Shrutika Manik Pardeshi	Shrutika	Shrutika	A	A	Shrutika	Shrutika	Shrutika	Shrutika	Shrutika	Shrutika
33	Miss. Gayatri Gajanan Patil	A	A	A	A	A	A	A	A	A	A
34	Miss. Sanika Prakah Thorbole	Sanika	Sanika	Sanika	Sanika	A	A	A	Sanika	Sanika	A
35	Miss. Sanika Sagar Chavan	A	A	A	A	A	A	A	A	A	Sanika
36	Miss. Sanika Shital Patil	A	A	A	A	A	A	A	A	A	A
37	Miss. Sanika Sanjay Patil	Sanika	Sanika	A	A	Sanika	Sanika	Sanika	Sanika	Sanika	Sanika
38	Miss Sayma Rashid Tamboli	A	A	Sayma	A	A	A	A	A	Sayma	A
39	Porja Amar Pawl	A	A	Porja	A	Porja	A	A	A	A	A
40	Kedar Sandosh Sutar	A	A	Kedar	A	Kedar	A	A	A	A	A





14/12 14/12-15/12

		<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>
38	Miss. Pooja Amar Patil	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>
39	Mr. Kedar Santosh Sutar	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>	<del>Patil</del>
40	Miss. Sayma Rashid Tamboli	A	A	A	A	A	A	A	A	A	A
41	Mr. Pankaj Sunil Zirange	<del>Patil</del>	<del>Patil</del>	A	A	A	A	A	A	<del>Patil</del>	<del>Patil</del>
42	Mr. Suraj Santosh Kandam	<del>Patil</del>	<del>Patil</del>	A	A	A	A	A	A	<del>Patil</del>	<del>Patil</del>
43	Mr. Mohit Sunil Mane	<del>Patil</del>	<del>Patil</del>	A	A	A	A	A	A	<del>Patil</del>	<del>Patil</del>
44	Mr. Fardin Mahamadhanif Makandar	<del>Patil</del>	<del>Patil</del>	A	A	A	A	A	A	A	A



5-11-22

Concept of Bioremediation.

Name

Sign

1. Snehal Babaso Kashid
2. Galaxy Sunil Pawar
3. Namrata Anil Kandalkar
4. Asavari Anil Kalamkar
5. Shrutika Manik Pardeshi
6. Sanika Prakash Thorbole
7. Sakshi Deepak Koli.
8. Prachi Chandrakant Kesarkar
9. Smita Lakshman Patil
10. Harshada Pradip Khot
11. Pranali Shivaji Vharamble.
12. Arpita Shivaji Patil.
13. Sanika Sanjay Patil
14. Damini Mohan Padaval
15. Dhanashri Raju Balekundri
16. Shukrani Chandrakant Kandalkar
17. Sanova Salim Mulla
18. Pallavi Ravindra Hande
19. Sharayu Pradheep Bhosale.
20. Rushita Dinkar Powar
21. Kedar Santosh Sutar
22. Atmanu Ramdas Gurew
23. Gardin Mahamadhan Makandur
24. Mohit Sunil Mone
25. Suzaj Santosh Kadam
26. Pankaj Sunil Zizange
27. Pooja Amar Patil

- SBK  
galaxy
- Namrata  
Asalamkar  
~~Smita~~ Smt.  
Shrutika
- Koli  
Kesarkar  
Patil  
Khot  
Vharamble
- Arpita  
Patil
- ~~Sanika~~  
~~Sanjay~~  
~~Patil~~
- Damini  
Padaval
- Dhanashri  
Balekundri  
Kandalkar
- Sanova  
Mulla  
Hande
- Bhosale
- Rushita  
Powar  
Sutar
- Gurew
- Makandur
- Mone
- Kadam
- Zizange
- Patil



VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

Department of Microbiology

Value Added Course

“Waste Water Management”

Theory Examination 2022-2023

Date: 03/02/2023

Total marks- 100

Time- 9.00am to 12.00pm

- Instructions: 1) All questions are compulsory  
2) Draw neat labeled diagram wherever necessary.  
3) Figures to the right indicates full marks

Q.1 Rewrite the sentence by choosing most correct alternative from the given alternatives. 20

i. .... treatment removes total solids present in sewage.

- a) Primary                      b) Secondary                      c) Tertiary                      d) Quaternary

ii. .... of the following is a tertiary treatment process.

- a) Oxidation pond   b) Trickling filter   c) Chlorination   d) Anaerobic sludge digestion

iii. In..... stage of anaerobic sludge digestion methane is formed.

- a) Hydrolysis                      b) Methanogenesis                      c) Acetogenesis                      d) Acetogenesis

iv. .... organism occupy special place on biodegradation process.

- a) *Bacillus*                      b) *Streptococcus*                      c) *Pseudomonas*                      d) *Nocardia*

v. .... is secondary air pollution

- a) PANs                      b) Ozone                      c) Carbon monoxide                      d) Nitrogen Monoxide

vi. .... is a residue left after burning.

- a) TDS                      b) TSS                      c) Ash                      d) TVS

vii. .... process use plant or algae to remove contaminant from environment.

- a) Bioaccumulation   b) Bioextraction                      c) Phytoextraction                      d) Biotransformation

viii. As per BIS, the BOD value of water should be less than ..... mg/litre

- a) 300                      b) 200                      c) 100                      d) 1000

ix. SPC is .....

- a) Simple plate count   b) Sequence plate count   c) Standard plate count   d) Standard plaque count

x. The amount of oxygen required for oxidation of organic matter by Microorganisms is known as.....

- a) Dissolved Oxygen                      b) BOD                      c) COD                      d) Total organic count

xi. Nitrocellulose is degraded by .....

- a) *Desulfuricans*                      b) *Klebsiella*                      c) *Rhizopus*                      d) *Cercospora*

xii. Total viable microbial count can be determined by using..... method.

- a) DMC                      b) SPC                      c) COD                      d) BOD





- xiii. To determine COD ..... is used as oxidising agent.  
 a) Pottasium sulfate    b) Pottassium iodide    c) Pottasium dichromate    d) Sodium dichromate
- xiv. .... is not major green house gas.  
 a) Ozone    b) Water vapor    c) methane    d) Carbon dioxide
- xv. COD value is always ..... than BOD.  
 a) Lower    b) Higher    c) Equals to    d) None of the above
- xvi. .... is used to increase rate of sedimentation in water.  
 a) Calcium sulfate    b) MgSO<sub>4</sub>    c) Alum    d) Sodium sulfate
- xvii. In ----- arrangement the earth is shaped in the form of leveled terraces to hold soil and water.  
 a) Teracing    b) Contour ploughing    c) Leaching    d) Strip forming
- xviii. .... is economically beneficial biological treatment process, as it produces biogas.  
 a) Aerobic digestion    b) Trickling filter    c) Oxidation ponds    d) Anaerobic sludge digestion
- xix. .... method indirectly measures concentration of organic compounds in water.  
 a) Dissolved oxygen    b) Total organic count    c) Chemical oxygen demand    d) All of above
- xx. In anaerobic digestion treatment process..... gas is generated.  
 a) NO<sub>2</sub>    b) CO    c) CH<sub>4</sub>    d) SO<sub>2</sub>

**Q.2 Attempt any two-**

40

- ii) Explain physical & chemical methods of water pollution monitoring.  
 iii) Explain in detail concept of biodegradation ,factors affecting biodegradation & types of biodegradation process.  
 ii) Describe in detail primary and secondary sewage treatment methods.  
 iii) Explain various Physico-chemical characteristics of water.

**Q.4 Attempt any four-**

40

- i) Root zone technology  
 ii) Water pollution  
 iii) Global warming  
 iv) Define following concept –Contaminant,Xenobiotics,Phytoaccumulation,Bioremediation,Consortium  
 v) Reclamation of soil  
 vi) Biological oxygen demand

VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

Department of Microbiology  
Value Added Course  
"Waste Water Management"  
Practical Examination 2022-2023

Date: 3<sup>rd</sup> Feb,, 2023

Time- 9.00am to 12.00pm

Total marks- 50

- 
- Q. 1. Determine the potability of the given water sample by MPN method.  
OR 15  
Enumerate the bacteria in the given sample by SPC method.  
OR  
Determine BOD of the given sewage sample.  
OR  
Determine COD of the given sewage sample.
- Q. 2. Determine alkalinity of given water sample by using suitable technique.  
OR 10  
Determine total dissolved solid content of water by using suitable technique
- 
- Q.3 Journals 10  
Q.4. Answer the spots A, B, C, D and E. 10  
Q.5. Viva Voce 05



**Vivekanand College (Autonomous), Kolhapur**  
**Department of Microbiology**  
**Value added course 2022-2023**  
**“Waste Water Management”**  
**Result summary**

Sr. No.	Name of student	Roll No.	Theory Marks (Out of 100)	Practical Marks (Out of 50)
1	Miss. Sanika Vishnu Chougule	101	63	44
2	Miss. Sakshi Satappa Patil	102	38	37
3	Miss. Avantika Arun Patil	103	40	37
4	Miss. Vaishnavi Jitendra Khot	104	45	37
5	Miss. Aishwarya Maruti Angaj	105	57	43
6	Miss. Vaishnavi Vivek Chandala	106	52	38
7	Miss. Shukrani C. Kandalkar	107	65	42
8	Miss. Dhanashri Raju Balekundri	108	37	43
9	Miss. Arpita Shivaji Patil	109	60	43
10	Miss. Sharayu Pradeep Bhosale	110	61	47
11	Miss. Rushita Dinkar Powar	111	59	47
12	Miss. Galaxy Sunil Pawar	112	48	35
13	Miss. Shriya Prakash Lole	113	Absent	30
14	Miss. Arpita Sachin Hawal	114	80	48
15	Miss. Swarupa Prasad Khairmode	115	43	40
16	Miss. Snehal Babaso Kashid	116	49	40
17	Miss. Shivani Vinayak Gurav	117	37	39
18	Miss. Asavari Anil Kalamkar	118	44	42
19	Miss. Namrata Anil Kandalkar	119	62	42
20	Miss. Sanovar Salim Mulla	120	61	48
21	Miss. Damini Mohan Padaval	121	52	46
22	Miss. Harshada Pradip Khot	122	43	44
23	Miss. Smita Lakshman Patil	123	62	40
24	Miss. Ankita Chotelal Sahani	124	57	43
25	Miss. Prachi Chandrakant Kesarkar	125	60	44





26	Miss. Pallavi Ravindra Hande	126	48	47
27	Miss. Sakshi Deepak Koli	127	58	46
28	Mr. Atharva Ramdas Gurav	128	36	42
29	Mr. Rahul Gautam Malavi	129	40	38
30	Mr. Rohan Ravindra Sawant	130	39	30
31	Miss. Pranali Shivaji Vharamble	131	52	38
32	Miss. Shrutika Manik Pardeshi	132	49	40
33	Miss. Gayatri Gajanan Patil	133	Absent	Absent
34	Miss. Sanika Prakash Thorbole	134	54	45
35	Miss. Sanika Sagar Chavan	135	36	45
36	Miss. Sanika Shital Patil	136	35	32
37	Miss. Sanika Sanjay Patil	137	35	40
38	Miss. Pooja Amar Patil	138	Absent	42
39	Mr. Kedar Santosh Sutar	139	56	42
40	Miss. Sayma Rashid Tamboli	140	57	45
41	Mr. Pankaj Sunil Zirange	141	53	44
42	Mr. Suraj Santosh Kadam	142	66	43
43	Mr. Mohit Sunil Mane	143	58	44
44	Mr. Fardin Mahamadhanif Makandar	144	37	41

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Signature of Jr. Super.

## शिवाजी विद्यापीठ, कोल्हापूर

परीक्षेच्या

या विषयाच्या प्रयोग परीक्षा

Practical Examination in Value added course (Microbiology)

at the \_\_\_\_\_ Examination

उमेदवाराचा आसन क्रमांक  
(Candidate's Seat No.)

125

विभाग  
(Section)

## उमेदवारांना सूचना

- प्रश्न काळजीपूर्वक वाचा आणि त्याप्रमाणे विचारलेला प्रयोग करा.
- उपकरणांच्या वापराबाबत तुम्हांला काही माहीत नसेल तर परीक्षक किंवा प्रयोगशाळा साहाय्यक यांना तुम्हाला मदत करण्याविषयी विनंती करा.
- कोणताही विद्युतप्रयोग करण्यापूर्वी, प्रत्यक्ष पुरविलेली सर्व उपकरणे आणि सर्व 'कनेक्शन' नीट पाहून घेऊन संबंधित कामाची नीटनेटकी कार्ययोजना करण्याची नितांत आवश्यकता आहे आणि ह्या नंतर, पुढे काम चालू करण्याविषयी परीक्षकांची परवानगी मिळविणे आवश्यक आहे.
- सर्व निरीक्षणे कोष्टकद्वारा तक्त्यात भरावी. मधल्या सर्व गणना आणि निर्णय हे शक्य तितक्या सुवाच्यपणे आणि स्पष्टपणे नोंदविलेले असणे हे हितावह आहे.
- प्रारंभिक किंवा अंतिम निरीक्षणात संख्यावाचक आकडे एकावर एक लिहू नयेत. जर लिहिलेला कोणताही आकडा नको असेल तर त्यावर एक रेष ओढून पाहिजे असलेला आकडा त्याच्याजवळ लिहा.
- प्रयोगशाळेतून बाहेर पडण्यापूर्वी आपले टेबल चांगल्या स्थितीत आहे याची खात्री करा.

## INSTRUCTIONS TO CANDIDATES

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Q.1)

i) a) Primaryii) c) chlorinationiii) b) methanogenesisiv) c) Pseudomonas



~~v)~~ a) PAN<sub>s</sub>

~~vi)~~ d) TVS

~~vii)~~ c) Phytoextraction

~~viii)~~ c) 100

~~ix)~~ c) Standard plate count.

~~x)~~ d) Total organic count

~~xi)~~ c) Rhizopus

~~xii)~~ b) SPC

~~xiii)~~ b) Potassium dichromate

~~xiv)~~ d) Carbon dioxide

~~xv)~~ b) Higher

~~xvi)~~ c) Alum

~~xvii)~~ d) Anaerobic sludge digestion

~~xix)~~ d) All of these above







xix) c) chemical oxygen demand

xy) c) CH<sub>4</sub>

Q.2

iv)

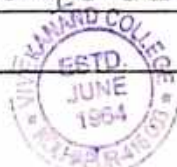
- Waste water contains a various compounds which are not suitable for us.
- This waste water is discharged in large water bodies without treatment.
- Treatment of water takes place with physical & chemical characters of water.

A) ~~Physical methods~~ characters of water.

- Physical characters includes total solids, total suspended solids, total dissolved solids, total volatile solids.
- Other than the above color, odour, temperature, density & specific gravity, turbidity is also considered.

1) Total solids :-

- Total solids are obtained by evaporating solids at 103°C - 105°C. Residue solids are total solids.
- Total solids are total suspended solids & total dissolved solids.





- Combination of TSS & TDS makes TS (Total Solids)

b) TSS -

- TSS means Total Suspended Solids.

- It contains various substances like decaying plants & animal matter, etc.

- These substances remain suspended in the water.

c) TDS -

- TDS means Total dissolved solids.

- It contains chlorides, minerals, organic matters

- It mostly contains charged ions.

d) TVS -

- TVS means Total Volatile Solids

- It ~~contains the~~ The sewage water is volatilized or burned off.

- It contains volatilized solids.

2) Color -

- Color of waste water changes from industry to industry.

- Color of waste water depends upon the amount of organic matter present in the water.

- Colour of waste water changes from light brownish to grey.





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## शिवाजी विद्यापीठ, कोल्हापूर

Practical-Examination in

परीक्षेच्या

या विषयाच्या प्रयोग परीक्षा

at the

Value added course (microbiology)

Examination

उमेदवाराचा आसन क्रमांक  
(Candidate's Seat No.)

125

विभाग  
(Section)

## उमेदवारांना सूचना

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(येथून लेखनास सुरवात करा.) (Begin writing here.)

3) odour -

It is produced by gas which is produced by decomposition of organic matter.

Odour is produced by decomposition of organic matter & also by adding substances into the water.

4) Temperature -

Temperature of water should be in the range of 15°C - 35°C. average temperature is approximately 28°C.





### 5) Density & Specific gravity :-

- It is mass per unit volume.
- It is measured in gm/lit. unit.
- Both are temperature dependent but varies with the concentration of total solids.

### 6) Turbidity :-

- It is amount of light absorbed in the waste water.
- It is measured by the specific instrument like spectrophotometer or colorimeter.

### B) Chemical characters :-

#### 1) pH -

- It is negative logarithm of hydrogen ion concentration.
- pH of sewage water is more than the normal water supply.
- Decomposition of organic matter makes the pH low.
- The range of pH of sewage water is 5-8 approximately.

#### 2) Inorganic matter

##### a) chlorides -

- chlorides are present in the waste water.
- Excess chloride can lead to various diseases.
- chlorides present in waste water is an index of pollution.





### b) Nitrogen -

- Nitrogenous compounds are present in water and
- i) Nitrogenous compounds of plants & animal
- ii) Atmospheric nitrogen
- Dissociation or breakdown of organic matter liberate  $N_2$  in the water.

### c) Phosphate -

- Excess use of synthetic detergents can add phosphate to the water.
- Phosphate is present in waste water (approximately 5-10 mg/lit).

### d) Heavy metals -

- Heavy metals like cadmium, neon, Argon, etc are present in the waste water.
- Heavy metals are oxidised in the water.
- This can add present in the range approximately 10-12 mg/lit.

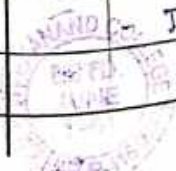
### 3) Organic matter -

- Organic matter contains all organic substance
- Carbohydrates, fats are also present in the water.

### a) BOD -

- BOD means Biological Oxygen Demand.
- Amount of organic matter present in the water is oxidised biologically
- Biological characters are involved in the process of BOD.

It is indirect method of measurement of concentration of organic matter in water.







4

- It is less than COD value.
- It is expressed in mg/lit.
- It has formula,

$$\text{BOD} = \frac{(A-B) \times N \times \text{dilution factor} \times 1000}{\text{Amount of sample taken}}$$

Amount of sample taken.

A = Difference bet<sup>n</sup> sample initial & sample final

~~N = N~~ N = Normality

~~A, B = Samples taken for BOD.~~

B = Difference bet<sup>n</sup> blank initial & blank final

b) COD.

- COD means chemical Oxygen Demand.
- The amount of organic matter present in water is oxidise by bacteria & other ~~org~~ microorganism by using chemical agent.
- COD value is always higher than the BOD value.
- It is also an indirect measurement of concentration of organic matter present in the water.
- Potassium dichromate is highly oxidising agent, which is mostly used in the COD.
- It has formula,

$$\text{COD} = \frac{(A-B) \times 8 \times N \times 1000}{\text{Amount of sample taken}}$$

Amount of sample taken





## शिवाजी विद्यापीठ, कोल्हापूर

परीक्षेच्या \_\_\_\_\_ या विषयाच्या प्रयोग परीक्षा  
 Practical Examination in \_\_\_\_\_  
 at the \_\_\_\_\_ Examination

उमेदवाराचा आसन क्रमांक \_\_\_\_\_ विभाग \_\_\_\_\_  
 (Candidate's Seat No.) 325 (Section)

## उमेदवारांना सूचना

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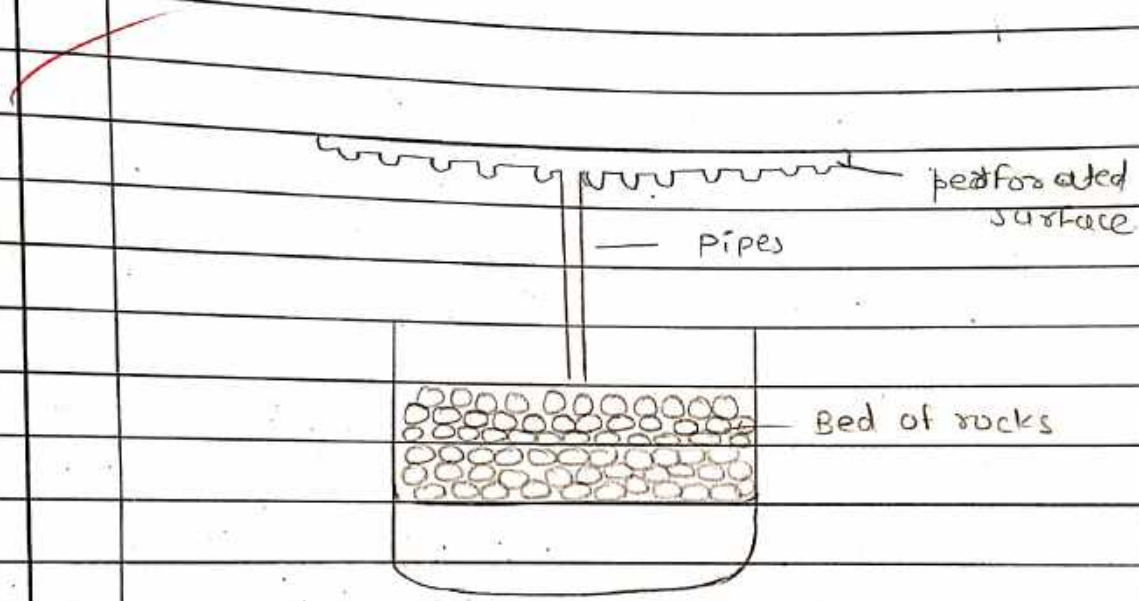
(देवून लेखनास सुरवात करा.) (Begin writing here.)

- Q 2
- iii)
- 1) Primary treatment :-  
- It is also called as physical treatment.
  - 2) Secondary treatment :-  
- It is also called as Biological treatment.  
- It takes place in absence & presence of oxygen.
  - a) Aerobic :- It is takes place in presence of oxygen.
  - b) Anaerobic :- It takes place in absence of





Secondary treatment :-  
Secondary treatment takes place through  
trickling filters, activated sludge, etc.



Trickling Filters

Trickling filters-

Trickling filters have perforated surface of bed with pipe

- P.



07



## शिवाजी विद्यापीठ, कोल्हापूर

Practical Examination in value added course (microbiology.) या विषयाच्या प्रयोग परीक्षा  
at the \_\_\_\_\_ Examination

उमेदवाराचा आसन क्रमांक 126 विभाग \_\_\_\_\_  
(Candidate's Seat No.) (Section)

### उमेदवारांना सूचना

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(येथून लेखनास सुरवात करा.) (Begin writing here.)

Q. 1.		
i)	Primary	treatment removes total solids present in sewage.
ii)	chlorination	of the following is a tertiary treatment process
iii)	<del>a) methanogenesis</del>	<del>or</del> <del>Acetogenesis</del>
iii)	b)	Methanogenesis







2

i)

→ c) Pseudomonas

ii)

→ A) PANs

iii)

→ d) TVs

iv)

→ c) phytoextraction

v)

→ a) 100 mg/lit

vi)

→ a) standard plate count.

vii)

→ b) BOD

viii)

→ c) Rhizopus

ix)

→ b) spc

x)

→ potassium  
→ c) sordium dichromate.



xiv)

→ d) carbon dioxide

xv)

b) Higher

xvi)

c) Alum

xvii)

d) strip forming

xviii)

c) oxidation ponds.

xix)

c) chemical oxygen demand

xx)

c) CH<sub>4</sub>

Q. 2

Physical and chemical <sup>characters</sup> ~~methods~~ of water ~~pollution~~

physical methods -

important physical character of waste water is total content of solid composed in colloidal matter, suspended matter, matter in solution.

other characters like, colour, odour, temperature, density, specific gravity.

waste water cause many organic matter present in water

1) Total solid - T.S.

waste water contain variety of material in dissolved and suspended form

Total solid is obtained by evaporating water 103° to 105°c and







residues the solid matter.

## 2) Total suspended solid (TSS)

- total suspended solid is separated from total dissolved solid by filtration.

- The wide variety of material, slits, decaying plant, animal matter and industrial waste, sewage con<sup>n</sup> in high level cause problem for aquatic life.

## 3) Total dissolved solid (TDS)

- total amount of material dissolve in water like minerals, salts in given amount of water.

## 4) Total volatile solid (TVS)

- waste water is volatilizable

- The water is high level volatilizable is not suitable for drinking, it contain synthetic organic compound eg. lignin.

## 5) Colour -

- The waste water colour changes from industry to industry.

- The colour of water depends on concentration of organic and inorganic compound.

- The waste water colour ranges from light brownish to gray.

## 6) odour -

- The IT is produced due to gas production.

- odour is depend on decomposition of





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## शिवाजी विद्यापीठ, कोल्हापूर

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 at the \_\_\_\_\_ Examination

उमेदवाराचा आसन क्रमांक  
 (Candidate's Seat No.)

326

विभाग  
 (Section)

## उमेदवारांना सूचना

- प्रश्न काळजीपूर्वक वाचा आणि त्याप्रमाणे विचारलेला प्रयोग करा.
- उपकरणांच्या वापराबाबत तुम्हाला काही माहीत नसेल तर परीक्षक किंवा प्रयोगशाळा साहाय्यक यांना तुम्हाला मदत करण्याविषयी विनंती करा.
- कोणताही विद्युतप्रयोग करण्यापूर्वी, प्रत्यक्ष पुरविलेली सर्व उपकरणे आणि सर्व 'कनेक्शन' नीट पाहून घेऊन संबंधित कामाची नीटनेटकी कार्ययोजना करण्याची नितांत आवश्यकता आहे आणि ह्या नंतर, पुढे काम चालू करण्याविषयी परीक्षकांची परवानगी मिळविणे आवश्यक आहे.
- सर्व निरीक्षणे कोष्टकात तक्त्यात भरावी. मधल्या सर्व गणना आणि निर्णय हे शक्य तितक्या सुवाच्यपणे आणि स्पष्टपणे नोंदविलेले असणे हे हितावह आहे.
- प्रारंभिक किंवा अंतिम निरीक्षणात संख्यावाचक आकडे एकावर एक लिहू नयेत. जर लिहिलेला कोणताही आकडा नको असेल तर त्यावर एक रेषा ओढून पाहिजे असलेला आकडा त्याच्याजवळ लिहा.
- प्रयोगशाळेतून बाहेर पडण्यापूर्वी आपले टेबल चांगल्या स्थितीत आहे याची खात्री करा.

## INSTRUCTIONS TO CANDIDATES

- Read the question carefully and perform the experiment as required.
- If there be anything the apparatus that you do not know, ask the examiner or the laboratory assistant to help you.
- Before doing any electrical experiment, it is absolutely essential that you make a neat working sketch of all apparatus actually provided and of the necessary connection, and obtain the examiner's permission to proceed.
- Express all observations in a tabular form.  
It is also desirable that all intermediate calculations and results should be entered as neatly and clearly as possible.
- No numerical figures should be written over either in the preliminary or final observations. If any figure is thought to be discarded it should be run through and the desired figure written near to it.
- Please see that your table is in good order before you leave the laboratory.

(येथून लेखनास सुरुवात करा.) (Begin writing here.)

	organic matter and by added the sub- stance in water eg. H <sub>2</sub> S, indole.
	- It is measured by H <sub>2</sub> S meter.
7)	Temperature -
	- temperature is higher than that of water supply.
	- waste water temperature ranges 15°C to 35°C and average 25°C.
	- It is affect on aquatic life.





phosphate.

organic content.

In waste water 50% to 75% of solid is suspended form and 30% to 40% in dissolved state.

In laboratory method, total organic matter is measured by BOD, COD and TOC

The waste water causing by animal, plant and human made activities.

Carbohydrate - starch, sugar, cellulose.

Fat and oil - domestic waste, butter, vegetable oil and fat.

① BOD - It is Biological oxygen demand.

~~It is less than COD value.~~

- It is indirect of measurement of concentration of organic matter of water.

- It is expressed in mg/lit.

15  
 $BOD = (A - B) \times N \times \text{dilution factor}$

Amount of sample taken

N - Normality A, B - sample taken for BOD.

② COD - It is chemical oxygen demand

- amount of chemical require for oxidation of organic matter.

- It is indirect of measurement of concentration of organic matter of water.







Q. 4.

ii) water pollution.

water is polluted from variety of sources like, bathing, washing the cloths, animals, domestic waste contain various substance. polluted water is not suitable for drinking.

water is polluted from various man made activities.

water pollution is big problem in environment. pollution means fit things in environment. water pollution from industrial waste. and polluted the lacks, rivers, ponds.

water is polluted and it is harmful for human being it causes disease. water pollution is widely from the industrial waste and sewage waste in the industry after from the product water is mostly used for the product recovery these industrial waste water passes through lacks and rivers and damage.

polluted water is filtered by various method and use for daily activities.

industry can add millions of organism and chemicals in the water bodies without treatment.

- treatment of water not take place.
- that's why pollution takes place.





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**VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR**  
**Department of Microbiology**  
**Value Added Course (2022-2023)**  
**Name of the course – “Waste Water Management”**

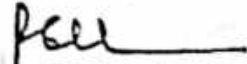
Name of Student: Mr. Suraj Santosh Kadam

Exam Seat No.- 142

	Theory	Practical	Grand Total	Percentage (%)	Remark
Max. Marks	100	50	150	72.66	First class
Min. Marks for passing	35	18	-		
Marks Obtained	66	43	109		

  
Course Co-ordinator



  
Principal  
PRINCIPAL  
Vivekanand College  
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**Department of Microbiology**  
**Value Added Course (2022-2023)**  
**Name of the course – “Waste Water Management”**

**Name-of Student: Miss. Sakshi Satappa Patil**

**Exam Seat No.– 102**

	Theory	Practical	Grand Total	Percentage (%)	Remark
Max. Marks	100	50	150	50.00	Second Class
Min. Marks for passing	35	18	-		
Marks Obtained	38	- 37	75		

  
**Course Co-ordinator**



  
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by UGC, Star College by DBT, Govt. of India



Department of  
Microbiology

**Certificate**

This is to certify that **Ms. Namrata Anil Kandalakar** of **B.Sc. I/III**  
**Roll No. 119** has successfully completed the value added course on  
**"Waste water management"** carried out in the Department of Microbiology,  
Vivekanand College, Kolhapur during **11<sup>th</sup> Oct. 2022 to 3<sup>rd</sup> Feb. 2023**  
This certificate is awarded to him/her after passing theory and practical examination.

**Mr. S. D. Gabale**  
Course co-ordinator



**Dr. R. R. Kumbhar**

Principal  
Vivekanand College  
Kolhapur