

**"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**

**"Industrial Pollution Control and Waste Treatment  
Technology"**



**Academic Year: 2018-2019**

"Education for Knowledge, Science and Culture"

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**VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR**

**Department of Microbiology**

**Value Added Course (2018-19)**

**Name of the course – "Industrial Pollution Control and Waste Treatment Technology"**

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**VIVEKANANDCOLLEG,KOLHAPUR.  
(AUTONOMOUS)  
DEPARTMENT OF MICROBIOLOGY**

**VALUE ADDED COURSE**

***INDUSTRIAL POLLUTION CONTROL AND WASTE  
TREATMENT TECHNOLOGY***

**2018-2019**



**• COURSE OUTCOMES**

- APPLY WASTE WATER TREATMENT METHODS
- UNDERSTAND IMPACTS OF POLLUTION ON ENVIRONMENT .



**LIMITED SEATS**

**REGISTER NOW**

**CONTACT: 9970191188**



**VIVEKANAND COLLEGE, KOLHAPUR.  
(AUTONOMOUS)  
DEPARTMENT OF MICROBIOLOGY**

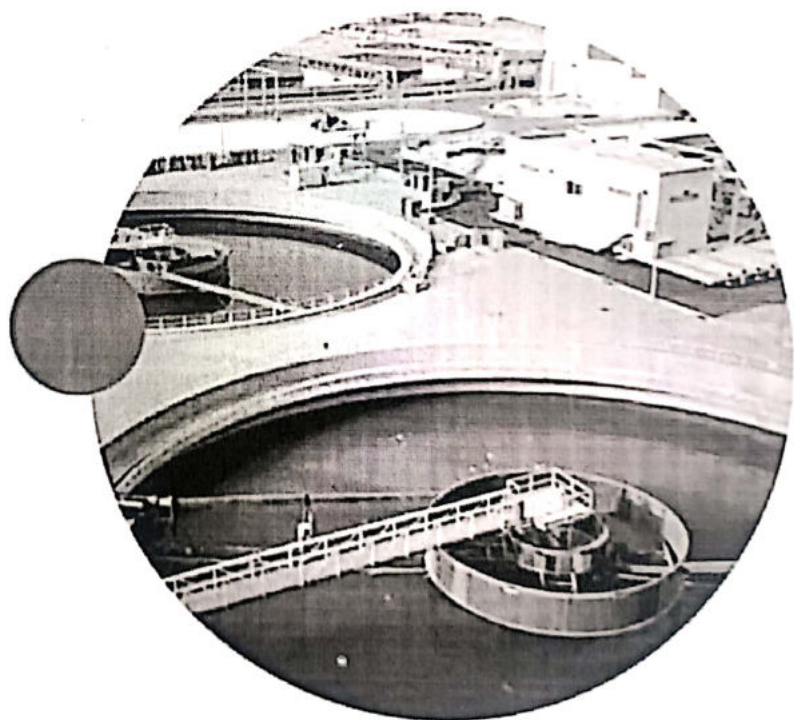
**VALUE ADDED COURSE  
INDUSTRIAL POLLUTION CONTROL AND WASTE  
TREATMENT TECHNOLOGY**

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**VIVEKANAND COLLEGE, KOLHAPUR**  
**DEPARTMENT OF MICROBIOLOGY**

**NOTICE**

All the B.Sc./B.Com./B.A. (I, II & III) students are hereby informed that Department of Microbiology is organizing Add on course entitled – "Industrial Pollution and waste treatment technology". The duration of the course will be of 6 months. Interested students should register their name in the department of Microbiology on/before 15th August, 2018 (11.30am to 4.30pm). The time table of the course will be displayed on notice board soon.

**Note: Fees for the course- Rs. 1000/- per student.**

*Dubur*  
**Head of department**  
**(Microbiology)**  
 Head/Co-ordinator  
 Department of Microbiology  
 Vivekanand College Kolhapur.



Politics III ✓  
 sociology III ✓  
 English III ✓  
 History III ✓  
 hindi III ✓  
 Eco III ✓  
 FE. B.Com. II ✓  
 B.A. III ✓  
 B.A. I Hindi ✓  
 B.A. II (Opt Eng) ✓  
 B.com. III (A) ✓  
 B.com. III (B). Dabodern ✓

B.Sc. III (Comp. Sci) ✓  
 B.A. III (Geog) ✓  
 B.com II ✓  
 B.A. II Hist ✓  
 B.A. I - H. Sec ✓  
 B.A. I. geog. ✓  
 B.com. I (A) ✓  
 B.com. I. B. Dabodern ✓  
 B.Sc. I ✓  
 B.Sc. I (A & C) ✓  
 B.Sc. III Chem ✓  
 B.Sc. III zoology ✓  
 M.Sc. II Chem ✓  
 M.Sc. E chem ✓

“Education for Knowledge, Science and Culture”

Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

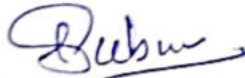
**VIVEKANAND COLLEGE, KOLHAPUR**

**DEPARTMENT OF MICROBIOLOGY**

## NOTICE

All the B.Sc./B.Com./B.A. (I, II & III) students are hereby informed that Department of Microbiology is organizing Add on course entitled – “Industrial Pollution and waste treatment technology”. The duration of the course will be of 6 months. Interested students should register their name in the department of Microbiology on/before 15th August, 2018 (11.30am to 4.30pm). The time table of the course will be displayed on notice board soon.

**Note: Fees for the course- Rs. 1000/- per student.**



**Head of department  
(Microbiology)**

*Head/Co-ordinator  
Department of Microbiology  
Vivekanand College Kolhapur*



"Dissemination of Education for Knowledge, Science and Culture"

- Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE, KOLHAPUR

Department of Microbiology

(Autonomous)

Add On Course

Name of the course – "Industrial Pollution and waste treatment technology"

Expenditure - 30000

Sr. No.	Heading	Particulars
1.	Title of the Course	Industrial Pollution 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.	No. of Years	Six months
5.	Level	Add-on
6.	Pattern	Annual
7.	Intake Capacity	30
8.	Fees	Rs. 1000/-
9.	Expenditure of Course	30,000/-
10.	Job opportunities	Sugar industry , Dairy industry ETP, Government and Private sectors
11.	To be implemented from the Academic Year	From Academic Year -June 2018-2019

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.



"Education for Knowledge, Science and Culture"

- Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)

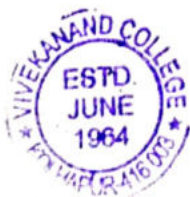
Department of Microbiology

Value Added Course 2018-2019

**"Industrial Pollution Control and waste treatment technology"**

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	Add-on
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 -June 2019-2020
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.





❖ **Course outcomes:**

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

- 1) Acquire skills required in various industries, research labs and in the field of human health.
- 2) Understand physic-chemical properties of waste water
- 3) Understand basic and advanced concepts in industrial pollution aspects and waste water treatment technologies.
- 4) Apply techniques for determination of characteristics of water.

**Title of the course: Industrial Pollution Control and waste water treatment technology**

**Total Lectures: 40**

**Total Marks: 100**

Course	Unit	Topic	L/Unit
Add-on	I	Fundamentals of Environmental pollution	10
Annual pattern	II	Environment protection and related laws	10
	III	Bioremediation	10
	IV	Waste water Treatment Technologies	12

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 pollution aspects and waste water treatment technologies.
- 4) To make the student knowledgeable with respect to the basic and advanced concepts in industries and in research field.

Total fees- 1500

**Title of the course: Industrial Pollution and waste water treatment technology**

**Total Lectures: 60**

**Total Marks: 100**

Course	Unit	Topic	L/Unit
Add-on	I	Fundamentals of Environmental pollution	15
Annual pattern	II	Environment protection and related laws	15
	III	Bioremediation	15
	IV	Waste water Treatment Technologies	15



## Theory

### UNIT-I

Lecture 15

#### 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

### UNIT-II

Lecture 15

#### Environmental laws

- Important terminologies related to Environmental laws  
Acceptable daily intake, Action level, Air mass, Best management practices (BMP), Community waste system.
- Environmental laws-  
The water pollution Act, 1974  
The air pollution Act, 1981  
The environmental Act, 1986
- Norms, rules and regulations of CPCB & MPCB
- Environmental Impact assessment-  
Need, scope, steps and techniques
- Permissible limits of waste generated by-  
Sugar industry, Distillery, Dairy, Paper & pulp industries, Textile industries



- 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-IV

#### Lecture 12

#### 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 laboratory equipments and instruments.
2.	Study of compound microscope.
3.	Cleaning & sterilization of glass wares
4.	Determination of physical parameters of waste water- Temperature, color, odor, pH
5.	Determination of total dissolved solids.
6.	Detection of E.C. of wastewater
7.	Determination of chlorides of wastewater
8.	Determination of alkalinity of wastewater
9.	Determination of DO of waste water
10.	Determination of BOD
11.	Determination of COD
12.	Determination of oil & grease from waste

13.	Determination of SPC of different waste
14.	Preparation of cultural media and its sterilization
15.	Determination of fecal contamination of water – Qualitative & Quantitative estimation.
16.	Techniques of microbial culture cultivation

**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	80
2.	Journal	10
3.	Field Visit	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

Add On Course (2018-19)

Name of the course – “Industrial Pollution and waste treatment technology”

Syllabus Distribution

Unit	Topic	No. of Lectures	Name of the Teacher
I	Fundamentals of Environmental pollution	10	Miss. R.R. Suryawanshi
II	Environment protection and relative laws	10	Mr.S.D. Gabale
III	Bioremediation	10	Miss. S.A.Pise
IV	Waste water treatment technologies	10	Miss.V.V.Misal
Practicals as per syllabus			



**VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR**

**Department of Microbiology**

**Add On Course (2018-19)**

**Name of the course – “Industrial Pollution Control and Waste Treatment Technology”**

**TIME TABLE**

<b>Time</b>	<b>Wednesday</b>	<b>Thursday</b>
<b>9.00am to 10.00am</b>	<b>VVM/SAP</b>	<b>RRS/SDG</b>
<b>10.00am to 11.00am</b>	<b>VVM/SAP</b>	<b>RRS/SDG</b>



**VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR**

**Department of Microbiology**

**Add On Course**

**Name of the course – “Industrial Pollution and waste treatment technology”**

**Time table**

All the students of Add on course “Industrial Pollution and waste treatment technology”, Department of Microbiology are hereby informed that the lectures and practical's of the course will be conducted on Wednesday and Thursday of every week from 09:00 am to 11:00 am.



**Course Co-ordinator**



**Head**

**Head**

**Department of Microbiology,  
Vivekanand College, Kolhapur**





**Add-on Course  
Attendance**

Sr. No.	Name of Student	03/10/18	4/10/18	10/10/18	11/10/18	17/10/18	24/10/18	25/10/18	31/10/18	01/11/18	02/11/18	08/11/18
1.	Anuse Neha Nandkishor .	P	P	P	P	A	P	P	P	P	P	P
2.	Athale Isha Aniket	P	P	P	A	A	A	P	P	P	P	A
3.	Band Manasi Yashwant	P	P	P	P	P	P	P	A	P	P	P
4.	Bandgar Rohini Suresh	P	A	P	P	P	P	A	P	P	P	P
5.	Bansode Dhairyashil Amrapal	P	A	A	P	A	P	A	P	P	P	A
6.	Bhagwat Prathmesh Bhagwantsinh	P	P	P	P	P	P	P	P	A	A	P
7.	Bhosale Sunita Dinkar	P	P	P	P	P	P	P	P	P	P	P
8.	Bornake Nayan Sunil	P	P	P	P	P	P	P	P	A	P	P
9.	Chopade Pratik Prabhakar	P	P	P	A	P	P	P	A	P	P	P
10.	Choudhari Rutuja Dileep	A	A	P	P	P	A	P	P	A	P	P
11.	Garande Prerana Vishnu	P	P	P	P	P	P	P	P	P	P	A
12.	Ghosalkar Prajakta Prabhakar	A	P	A	P	P	P	P	P	P	P	P
13.	Giri Bhagyashree Suresh .	A	A	P	A	P	P	A	P	P	P	A
14.	Gosavi Payal Jagdish	P	A	A	P	P	P	A	P	P	P	P
15.	Jadhav Aishwarya Ajitkumar	P	P	P	P	P	P	P	P	P	A	P
16.	Jangam Amruta Ashok	P	P	P	P	P	P	P	P	P	P	A
17.	Jong Arati Ashok	P	A	A	A	P	P	P	P	P	P	P
18.	Kalyankar Susmita Sambhaji	A	A	P	P	P	P	P	P	P	P	P
19.	Kendre Shrinivas Prabhakar	P	P	P	P	A	P	P	P	P	P	P
20.	Kothalikar Pooja Ananda	P	P	P	P	P	P	A	P	P	P	P
21.	Mestri Anjum Imtiyaj	P	P	P	P	P	P	P	P	P	P	P
22.	Mhetri Aniket Sukumar	P	P	P	P	P	A	A	P	P	A	A
23.	Mujawar Ayan Dastagir	P	A	A	P	P	P	P	A	P	P	P
24.	Nikalje Pooja Fulchand	P	P	P	P	A	P	P	P	P	P	P
25.	Patil Aarati Pandurang	A	A	P	P	A	P	P	A	P	P	P
26.	Patil Asmita Maruti	P	A	A	P	P	P	P	P	A	P	A
27.	Patil Shraddha Tanaji	P	A	A	P	P	P	P	P	A	P	A
28.	Patil Snehal Sudhakar	P	P	P	P	P	P	P	P	P	P	P
29.	Shinde Harshada Sambhaji	P	P	P	P	A	P	P	P	P	P	P
30.	Shinde Vishal Dilip	P	P	P	P	P	P	P	A	A	A	A
31.	Toraskar Nayan Mahadev	P	P	P	P	A	P	P	P	P	P	A



## Add-on Course Attendance

Sr. No.	Name of Student	05/12/18	06/12/18	12/12/18	13/12/18	19/12/18	20/12/18	26/12/18	27/12/18	02/01/19	03/01/19	09/01/19
1.	Anuse Neha Nandkishor	P	P	P	P	P	P	P	A	P	P	P
2.	Athale Isha Aniket	P	P	P	P	P	A	A	A	P	A	A
3.	Band Manasi Yashwant	P	A	P	P	A	P	A	A	P	P	P
4.	Bandgar Rohini Suresh	P	P	P	P	P	P	P	P	P	P	P
5.	Bansode Dhairyashil Amrapal	A	A	P	P	P	A	P	P	P	P	P
6.	Bhagwat Prathmesh Bhagwantsinh	P	P	P	P	P	P	P	P	A	P	P
7.	Bhosale Sunita Dinkar	P	P	P	P	P	P	P	P	P	P	P
8.	Bornake Nayan Sunil	A	A	A	P	P	P	A	P	P	A	P
9.	Chopade Pratik Prabhakar	A	P	P	P	A	A	A	P	A	P	P
10.	Choudhari Rutuja Dileep	P	P	A	P	P	P	P	A	A	P	P
11.	Garande Prerana Vishnu	P	P	P	P	P	A	A	A	A	P	P
12.	Ghosalkar Prajakta Prabhakar	P	P	A	P	P	P	P	A	P	P	P
13.	Giri Bhagyashree Suresh	A	A	P	P	P	P	P	A	P	A	A
14.	Gosavi Payal Jagdish	P	P	P	A	P	P	P	P	A	A	P
15.	Jadhav Aishwarya Ajitkumar	A	P	P	P	P	P	P	P	P	P	P
16.	Jangam Amruta Ashok	P	A	P	P	P	P	P	P	P	P	P
17.	Jong Arati Ashok	A	A	P	P	P	P	A	A	A	P	P
18.	Kalyankar Susmita Sambhaji	P	P	P	A	A	P	P	P	A	P	P
19.	Kendre Shrinivas Prabhakar	P	P	P	P	P	A	A	A	P	P	P
20.	Kothalikar Pooja Ananda	P	P	P	P	A	A	P	P	P	A	P
21.	Mestri Anjum Imtiyaj	P	P	P	A	P	P	P	P	P	P	P
22.	Mhetri Aniket Sukumar	A	A	P	P	P	P	P	A	A	A	P
23.	Mujawar Ayan Dastagir	P	P	A	A	P	P	A	P	A	A	P
24.	Nikalje Pooja Fulchand	P	P	P	P	P	P	P	P	P	P	P
25.	Patil Aarati Pandurang	P	P	P	A	P	A	P	A	A	P	P
26.	Patil Asmita Maruti	A	P	A	P	P	P	P	A	P	P	P
27.	Patil Shraddha Tanaji	A	P	A	P	P	P	P	P	P	A	P
28.	Patil Snehal Sudhakar	P	P	A	P	P	P	P	P	P	P	P
29.	Shinde Harshada Sambhaji	P	P	P	A	P	P	P	P	P	P	P
30.	Shinde Vishal Dilip	A	P	P	P	A	P	P	A	P	A	P
31.	Toraskar Nayan Mahadev	A	P	A	P	P	P	P	P	P	A	P



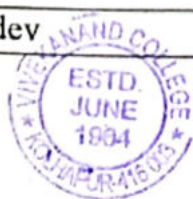
## Add-on Course Attendance

Sr. No.	Name of Student	16/01/19	17/01/19	23/01/19	24/01/19	30/01/19	31/01/19						
1.	Anuse Neha Nandkishor	P	P	P	P	A	A						
2.	Athale Isha Aniket	A	A	P	P	P	A						
3.	Band Manasi Yashwant	P	P	A	A	P	P						
4.	Bandgar Rohini Suresh	P	P	A	P	P	P						
5.	Bansode Dhairyashil Amrapal	A	A	P	P	P	P						
6.	Bhagwat Prathmesh Bhagwantsinh	P	A	P	P	P	P						
7.	Bhosale Sunita Dinkar	P	P	P	A	P	P						
8.	Bornake Nayan Sunil	A	A	P	P	P	P						
9.	Chopade Pratik Prabhakar	P	A	A	P	P	P						
10.	Choudhari Rutuja Dileep	A	P	P	P	P	A						
11.	Garande Prerana Vishnu	P	P	P	P	A	A						
12.	Ghosalkar Prajakta Prabhakar	A	P	P	P	P	P						
13.	Giri Bhagyashree Suresh	A	A	P	P	P	P						
14.	Gosavi Payal Jagdish	A	P	P	P	P	A						
15.	Jadhav Aishwarya Ajitkumar	P	P	P	P	A	P						
16.	Jangam Amruta Ashok	P	P	P	P	P	P						
17.	Jong Arati Ashok	P	P	P	P	A	A						
18.	Kalyankar Susmita Sambhaji	A	P	A	P	P	P						
19.	Kendre Shrinivas Prabhakar	P	P	P	P	A	P						
20.	Kothalikar Pooja Ananda	P	P	P	P	P	P						
21.	Mestri Anjum Imtiyaj	P	P	P	P	P	P						
22.	Mhetri Aniket Sukumar	P	A	P	A	P	P						
23.	Mujawar Ayan Dastagir	A	P	P	A	P	P						
24.	Nikalje Pooja Fulchand	P	P	A	P	P	P						
25.	Patil Aarati Pandurang	A	P	P	P	P	P						
26.	Patil Asmita Maruti	P	P	P	P	P	A						
27.	Patil Shraddha Tanaji	A	P	P	P	P	A						
28.	Patil Snehal Sudhakar	P	P	A	P	P	P						
29.	Shinde Harshada Sambhaji	P	P	P	P	P	P						
30.	Shinde Vishal Dilip	A	A	P	P	P	P						
31.	Toraskar Nayan Mahadev	A	A	P	P	P	P						



**Add-on Course**  
**Attendance (Practicals)**

Sr. No.	Name of Student	06/2/19	07/2/19	13/02/19	14/02/19	20/2/19	21/2/19	6/05/19	07/05/19	08/05/19	10/05/19	10/05/19
1.	Anuse Neha Nandkishor	P	P	P	P	A	P	P	P	P	P	P
2.	Athale Isha Aniket	P	P	P	P	A	P	P	P	P	P	P
3.	Band Manasi Yashwant	P	P	P	P	A	P	P	P	P	P	P
4.	Bandgar Rohini Suresh	P	P	P	P	P	P	P	P	P	P	P
5.	Bansode Dhairyashil Amrapal	A	P	P	P	P	P	A	P	P	P	P
6.	Bhagwat Prathmesh Bhagwantsinh	P	P	P	P	P	A	P	P	P	P	P
7.	Bhosale Sunita Dinkar	P	P	P	P	A	P	P	P	P	P	P
8.	Bornake Nayan Sunil	P	P	P	P	A	P	P	P	A	P	P
9.	Chopade Pratik Prabhakar	A	P	P	P	P	P	A	P	P	P	P
10.	Choudhari Rutuja Dileep	P	A	P	P	P	P	P	A	P	P	P
11.	Garande Prerana Vishnu	P	P	P	P	A	P	P	P	P	P	P
12.	Ghosalkar Prajakta Prabhakar	P	P	P	P	P	P	P	P	P	P	P
13.	Giri Bhagyashree Suresh	A	P	P	P	P	P	A	P	P	P	P
14.	Gosavi Payal Jagdish	P	P	A	P	P	P	A	P	P	P	P
15.	Jadhav Aishwarya Ajitkumar	P	P	P	P	P	A	P	P	P	A	A
16.	Jangam Amruta Ashok	P	P	P	P	P	P	P	P	P	P	P
17.	Jong Arati Ashok	P	A	P	P	P	P	A	P	P	A	A
18.	Kalyankar Susmita Sambhaji	P	A	P	P	P	P	P	A	P	P	P
19.	Kendre Shrinivas Prabhakar	P	P	P	P	A	P	P	P	P	P	P
20.	Kothalikar Pooja Ananda	P	P	P	P	A	P	P	P	P	P	P
21.	Mestri Anjum Imtiyaj	P	P	P	P	P	P	P	P	P	P	P
22.	Mhetri Aniket Sukumar	A	P	P	A	P	P	A	P	P	P	P
23.	Mujawar Ayan Dastagir	P	A	P	P	P	P	P	P	P	P	P
24.	Nikalje Pooja Fulchand	P	P	P	P	P	P	P	P	P	P	P
25.	Patil Aarati Pandurang	P	P	A	P	P	P	A	P	P	P	P
26.	Patil Asmita Maruti	P	P	A	P	P	P	A	P	P	P	P
27.	Patil Shraddha Tanaji	P	P	A	P	P	P	A	P	P	P	P
28.	Patil Snehal Sudhakar	P	P	P	P	P	P	P	A	P	P	P
29.	Shinde Harshada Sambhaji	P	P	P	P	P	P	P	P	P	P	P
30.	Shinde Vishal Dilip	A	P	P	P	P	P	A	A	P	P	P
31.	Toraskar Nayan Mahadev	A	P	P	P	P	P	A	A	P	P	P



VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

Department of Microbiology

Add On Course

Name of the course – “Industrial Pollution and waste treatment technology”

### Exam Time table

All the students of Add on course “Industrial Pollution and waste treatment technology”, Department of Microbiology are hereby informed that, the theory and practical examination of the course will be conducted on 13th and 14th July, 2019.



Course Co-ordinator



Head

Head

Department of Microbiology,  
Vivekanand College, Kolhapur



VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

Department of Microbiology

Add On Course 2018-2019

“Industrial Pollution and waste treatment technology”

Practical Examination 2018-19

Duration- 1 day

Total marks- 50

Time- 11.00am to 5.00pm

- 
- Q. 1. Determine the potability of the given water sample by MPN method. 15  
OR  
Enumerate the bacteria in the given tomato sauce by SPC method.  
OR  
Determine BOD of the given sewage sample.  
OR  
Determine BOD of the given sewage sample.
- Q. 2. Determine alkalinity of given water sample by using suitable technique. 10
- 
- Q.3 Journals 10  
Q.4. Answer the spots A, B, C, D and E. 10  
Q.5.Tour report. 05



VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR  
Department of Microbiology  
Add On Course 2018-2019  
"Industrial Pollution control and waste treatment technology"  
Theory Examination 2018-19

Date: 14th July, 2019

Total marks- 100

Time- 11.00am to 2.00pm

- 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. In Air pollution act ..... no. of sections are involved.  
a) 54                      b) 26                      c) 34                      d) 56
- ii. 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
- iii. The complete description of environment is involved in.....  
a) Baseline studies      b) Identification of impacts    c) Prediction of impacts    d) Evaluation of impacts
- iv. Total viable microbial count can be determined by using..... method.  
a) DMC                      b) SPC                      c) COD                      d) BOD
- v. The process of removal of environmental pollutants from soil, air, water using micro-organisms is called.....  
a) Bioaccumulation      b) Bioremediation          c) Phyto-extraction          d) Biotransformation
- vi. Environment protection act was enacted in the year.....  
a) 1974                      b) 1981                      c) 1986                      d) 1996
- vii. To determine COD ..... is used as oxidising agent.  
a) Pottassium sulfate    b) Pottassium iodide      c) Pottassium dichromate    d) Sodium dichromate
- viii. Consortium is known as.....  
a) Contaminant          b) Xenobiotics              c) Cocktail of Microorganisms    d) Bioconcentration
- ix. Dissolved oxygen can be measured by using.....device.  
a) Online DO meter      b) Spectrophotometer      c) pH meter                      d) Colorimeter
- x. .... is used to increase rate of sedimentation in water.  
a) Calcium sulfate      b) MgSO<sub>4</sub>                      c) Alum                      d) Sodium sulfate
- xi. .... is a physical characteristic of waste water.  
a) pH                      b) Total dissolved solids      c) Total alkalinity              d) Temperature
- xii. Any solid, liquid or gaseous substance present in such a concentration which may be injurious to environment is called.....  
a) Environmental pollution    b) Environmental pollutant    c) Occupier                      d) None of these



- xiii. .... method indirectly measures concentration of organic compounds in water.  
 a) Dissolved oxygen    b) Total organic count    c) Chemical oxygen demand    d) All of above
- xiv. 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>
- xv) Trickling filter is an example of ..... treatment process.  
 a) Primary                      b) Secondary                              c) Tertiary                                      d) Quaternary
- xvi) ..... process is used to reduce evaporation of soil by covering soil surface.  
 a) Strip farming                      b) Terracing                              c) Contour ploughing                              d) Mulching
- xvii) ..... treatment removes total solids present in sewage.  
 a) Primary                      b) Secondary                              c) Tertiary                                      d) Quaternary
- xviii) ..... gas is responsible for acid rain.  
 a) CO<sub>2</sub>                      b) CO                                      c) SO<sub>2</sub>                                      d) CH<sub>4</sub>
- xix) Noise pollution is measured in terms of .....  
 a) MHz                      b) Decibel                                      c) Wavelength                                      d) Richter
- xx) In..... process microorganism produces methane.  
 a)Hydrolysis                      b)Methanogenesis                              c)Acetogenesis                                      d)Acetogenesis

**Q.2 Attempt any two-**

30

- i. Describe various sections involved in Environmental Protection Act 1986.
- ii) Explain various Physico-chemical characteristics of water.
- iii) Define Biodegradation and explain types of biodegradation.

**Q.3 Attempt any two-**

30

- i) Describe in detail biological methods of water pollution monitoring
- ii) Explain in detail sewage water treatment methods
- iii) Explain in detail hazardous waste treatment

**Q.4 Attempt any four-**

20

- i) Air Protection Act
- ii) Environmental impact assessment
- iii) Biomagnification of Xenobiotic molecules
- iv) Factors affecting biodegradation and enzymes system for biodegradation
- v) Reclamation of Waste land
- vi) Root zone technology







॥ ज्ञान, विज्ञान आणि सुसंस्कार यांसाठी शिक्षण प्रसार ॥

- शिक्षणमहर्षी डॉ. बापूजी साळुंखे

Shri Swami Vivekanand Shikshan Sanstha's

# VIVEKANAND JUNIOR COLLEGE, KOLHAPUR

कोल्हापूर

Answer Paper

Signature of Supervisor \_\_\_\_\_

Exam.: Industrial pollution Roll No.: 107 Class: \_\_\_\_\_ Div.: \_\_\_\_\_

Subject: Environmental Science Paper: \_\_\_\_\_ Section: \_\_\_\_\_ Date: 14/7/19

BEGIN YOUR ANSWER ON THE PAGE ITSELF WRITE BOTH SIDE OF THE PAPER

Question No.	1	2	3	4	5	6	7	8	9	10	Total	Out of
Marks Obtained	19	28	18	16							81	100

SOL

i) In Air pollution act 54 no. of sections are involved.

ii) The amount of oxygen required for oxidation of organic matter by microorganisms is known as BOD.

iii) The complete description of environment is involved in baseline studies.

iv) Total viable count can be determined by using SPC.

v) The process of removal of environmental pollutants from soil, air, water using microorganisms is called Bioremediation.

vi) Environmental protection act was enacted in the year 1986.



vii) To determine COD Potassium dichromate is used as oxidising agent.

viii) Consortium is known as cocktail of microorganisms.

ix) Total dissolved solids is a physical characteristic of waste water.

x) Dissolved oxygen can be measured online DO meter.

xii) Any solid, liquid or gaseous substance present in such concentration which may be injurious to environment is called Environmental pollutant.

xiii) Chemical oxygen demand method indirectly measures concentration of organic compounds in water.

xiv) In anaerobic digestion treatment process CH<sub>4</sub> gas is generated.

xv) Trickling filter is an example of secondary treatment process.

xvi) Mulching process is used to reduce evaporation of soil by covering soil surface.

of suspended solids and dissolved solids. Solids can be removed by evaporation of waste water at  $103-105^{\circ}\text{C}$ . The waste water contains 0.1% solids.

a) Total suspended solids :

- Total suspended solids can be separated by filtration, which contains plant material, dead & decaying matter.

b) Total dissolved solids

- These are charged ions containing minerals, salts and metals.

- Shows conductance of water.

- More salts more salinity and more conductance.

c) Total volatile solids :

- The solids which are burned at high temperature from organic matter.

- Not suitable for drinking and contains synthetic organic compounds.

② colour

- The colour waste is, changes from industry to industry. Colour of waste depends upon organic matter added in water. Generally the colour of waste ranges from brownish gray to black.

- Due to presence of sulphides - black colour.

- Waste from kitchen, bathroom - brown colour.



Shri Swami Vivekanand Shikshan Sanstha's  
**VIVEKANAND JUNIOR COLLEGE, KOLHAPUR**

Answer Paper

Signature of Supervisor \_\_\_\_\_

Exam.: \_\_\_\_\_ Roll No.: 107 Class: \_\_\_\_\_ Div.: \_\_\_\_\_

Subject: \_\_\_\_\_ Paper: \_\_\_\_\_ Section: \_\_\_\_\_ Date: 14-7-19

BEGIN YOUR ANSWER ON THE PAGE ITSELF WRITE BOTH SIDE OF THE PAPER

Question No.	1	2	3	4	5	6	7	8	9	10	Total	Out of
Marks Obtained												

3) odour:

- The odour of waste is due to the decomposition of organic matter, also due to presence of  $H_2S$  gas, indole, mercaptans, chemical substance.

- The odour can be measured by  $H_2S$  meter.

4) Temperature:

- The temperature of waste is slightly higher than normal water supply.

- General range of temperature is  $15^\circ C$  to  $37^\circ C$  but temperature of waste is  $28^\circ C$ .

5) Specific gravity or weight:

- it is mass / unit volume.

- measured as  $mg/lit$ .

- It is same to normal water, but after addition organic matter it changes.

- specific gravity of water is  $1 mg/lit$



and from Atmospheric  $N_2$ .

- Untreated sewage contains 20-50 mg/lit of  $N_2$ .

### iii) Phosphates.

- The phosphates originates from synthetic compounds.
- The untreated sewage contains 5-10 mg/lit of phosphate.

### 4) Heavy metals :

- The waste water contains various elements and compounds such as cadmium, chromium, nickel, zinc, iron.
- Presence of Heavy metals in water, is not used for beneficial uses & affects suitability of water.

### 5) Organic Content

- The organic content from sewage measured by using following methods.

#### i) BOD

- BOD is the amount of  $O_2$  required by ~~microorganisms~~ to oxidise organic matter.

It is indirect method. In BOD not complete oxidation of organic matter but only biochemically degraded is oxidised.

- BOD can be done by using bottles having capacity 300ml.

- In BOD, sewage sample is mixed

**VIVEKANAND JUNIOR COLLEGE, KOLHAPUR.**



कोल्हापूर

Answer Paper

Signature of Supervisor \_\_\_\_\_

Exam.: \_\_\_\_\_ Roll No.: 107 Class: \_\_\_\_\_ Div.: \_\_\_\_\_

Subject: \_\_\_\_\_ Paper: \_\_\_\_\_ Section: \_\_\_\_\_ Date: 14-7-19

BEGIN YOUR ANSWER ON THE PAGE ITSELF WRITE BOTH SIDE OF THE PAPER

Question No.	1	2	3	4	5	6	7	8	9	10	Total	Out of
Marks Obtained												

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

3) Total organic carbon:

- not used commonly method.
- ~~TOC~~ measured from sewage by using high temperature furnace or maintaining oxidisable environment.

14

Q.2 Environmental protection act 1986

- The Environmental protection act was enacted for the protection, prevention control and abatement of environment and hazards to human beings, living creatures, plant, microorganisms and property is the basic idea for the protection and improvement in environment.
- As per declaration in the United state conferences on Human environment held at stockholm in 1972 (June) for protection of environment.



- Handling in relation to substance, i.e. manufacturing, processing, treatment, packaging, storage, use, collection, destruction, transfer etc.
- Hazardous substance related to, the substances which causes harm due to their physical & chemical character and ~~handling~~ to the human beings, plants, microorganisms and environment.
- occupier is person who has control over the affairs of industry.

## Chapter 2

- Section 3 from this act includes the all general power given to central government. Includes following measures.
  - To plan & execute Nation-wide programme of protection & prevention.
  - To lay down the standards for quality.
  - To lay down standard for emission of environmental pollutants.
  - To investigate the equipments, plants, ~~any other~~ material.
  - To ~~inspect~~ the environmental laboratories.
  - To collect information about environmental pollution & disseminate it.
  - standards & safeguards related to Hazardous substances.



using screeners.

- Solids contain coarse material & settleable material.

1) Screening: Primary method to remove solids sewage water. It removes the material like plastic bags, rags, plant material. It prevent the clogging during secondary treatment.

- different types of screeners used

1) coarse screeners - remove metal particles.

2) medium sized - removes particles having size 20-40 mm.

3) Fine screeners - remove particles having size 2-4 mm.

- Bar screening:

- made up of mesh which made up of steel bars having size 19 mm.

- particles removed mechanically by screeners which are drum shaped.

2) secondary treatment includes trickling filter, oxidation ponds, anaerobic digestion (aerobic & anaerobic)

- Biological treatment

3) Tertiary treatment: chlorination and ozonation used.

05



Shri Swami Vivekanand Shikshan Sanstha's  
VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

Department of Microbiology

Add-on Course (2019-2020)

Name of the course – "Industrial Pollution Control and Waste Treatment Technology"

Name of Student: Miss. Snehal Sanjay Bolaikar

Exam Seat No.- 201

	Theory	Practical	Grand Total	Percentage (%)	Remark
Max. Marks	100	50	150	51.33	Pass with Second Class
Min. Marks for passing	35	18	-		
Marks Obtained	40	37	77		

  
Co-ordinator

  
Principal  
PRINCIPAL  
Vivekanand College  
Kolhapur



Shri Swami Vivekanand Shikshan Sanstha's  
VIVEKANAND COLLEGE (AUTONOMOUS), KOLHAPUR

Department of Microbiology

Add-on Course (2019-2020)

Name of the course – “Industrial Pollution Control and Waste Treatment Technology”

Name of Student: Mr. Omkar Shashikant Chaugale

Exam Seat No.– 202

	Theory	Practical	Grand Total	Percentage (%)	Remark
Max. Marks	100	50	150	49.33	Pass with Second Class
Min. Marks for passing	35	18	-		
Marks Obtained	42	32	74		

  
Co-ordinator



  
Principal  
PRINCIPAL  
Vivekanand College  
Kolhapur



"Education for Knowledge, Science and Culture"

- Shikshanmaharshi Dr. Bapuji Salunkhe

# Shri Swami Vivekanand Shikshan Sanstha's **Vivekanand College, Kolhapur (Autonomous)**

NAAC Accredited 'A' Grade with CGPA 3.24, College with Potential for Excellence  
by UGC, Star College by DBT, Govt. of India



Department of  
Microbiology

## **Certificate**

This is to certify that Ms. Sayali Bhausahab Lad of B.Sc. I/II/III  
Roll No. 209 has successfully completed the value added course on  
**"Waste water management"** carried out in the Department of Microbiology,  
Vivekanand College, Kolhapur during 26<sup>th</sup> Aug. 2019 to 1<sup>st</sup> Jan 2020  
This certificate is awarded to him/her after passing theory and practical examination.

Mr. S. D. Gabale  
Course co-ordinator



Dr. S. Y. Hongekar  
Principal  
PRINCIPAL  
Vivekanand College