Dr.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

CIRCULAR NO.SU/Sci./B.Sc.Env.Sci /09/2023

It is hereby inform to all concerned that, the syllabus prepared by the Ad-hoc Board in Environmental Science and recommended by the Dean, Faculty of Science & Technology the **Academic Council at its meeting held on 13 June 2023 has accepted the Syllabus of B.Sc. Environmental Science Vth & VIth semester under Choice Based Credit Grading System** as appended herewith.

This shall be effective from the Academic Year 2024-25 and onwards.

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
REF.NO. SU/SCI/2023/13962-70
Date:- 10.07.2023.

Deputy Registrar,
Academic Section.

Copy forwarded with compliments to :-

1] **The Principal of all concerned affiliated Colleges,**
Dr. Babasaheb Ambedkar Marathwada University,

2] **The Director, University Network & Information Centre, UNIC, with a request to upload this Circular on University Website.**

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1] The Director, Board of Examinations & Evaluation,Dr.BAMU,A'bad.
2] The Section Officer,[B.Sc.Unit] Examination Branch,Dr.BAMU,A'bad.
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7] The Record Keeper, Dr.BAMU,A'bad.

Dr. Babasaheb Ambedkar Marathwada University

Aurangabad-431004(MS) India

Undergraduate Bachelor Degree Program in Science (B.Sc.)

Environmental Science (Optional Subject)

First Year, Second Year & Third Year

Course Structure and Curriculum

(Outcome based Curriculum)

Choice Based Credit System

(Effective from AcademicYear2022-23)

Dr. Babasaheb Ambedkar Marathwada University

Aurangabad– 431004 (MS) India

11/05/23

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1. Preamble

The course curriculum for undergraduate studies under choice-based credit system (CBCS) for B.Sc. in Environmental Science is framed in this document. This exercise was undertaken as part of the nationwide curriculum restructuring initiative by the National Education Policy.

As enshrined in the National Education Policy vision of introducing course curriculum for undergraduate studies under Choice Based Credit System (CBCS), the main objective of framing this curriculum of B.Sc. in Environmental Science is to impart the students a holistic understanding of the subject giving substantial weightage to the core contents, skill, value-based and ability enhancement. The syllabus has given due importance on the main streams of the body of knowledge on 'Environment' with due recognition of its wide spectrum. The ultimate goal of the syllabus is to enable the students to have an in-depth knowledge on the subject and enhance their scope of employment at every level of exit. Adequate emphasis has been given on the new and emerging techniques and understanding of the subject under the changing regime and global context.

There is need to strengthen the students to understand essential aspects of environmental science in diverse subject areas such as ecology, environmental chemistry, environmental pollution, environmental geo-science, atmospheric sciences, biodiversity, natural resources management, global warming, climate change and waste management. The curriculum lays focus on creating new knowledge, acquiring new skills and capabilities in Environmental Science producing an intelligent human resource serving the Environment and society, focusing on problem solving critical thinking, team work and collaboration. There is also an additional emphasis in providing opportunities to understand the integration of modern disciplines such as environmental modeling, geographical information systems and remote sensing, environmental sustainability, corporate governance and their applications to environmental sciences. Students would be encouraged to go beyond the classroom and conduct active action-research, research projects, technology-based learning and internships in industry/ private/government/manufacturing and service sectors based on suitability. Lectures and classroom sessions are accompanied with on-field visits, industrial visits, seminars, laboratory experiments and in-plant training. Educational visits are an integral part of teaching Environmental Science. These interventions are compulsory and essential aspects of the curriculum. There are optional subject that can be chosen by the students as per their desire and their professional choices. It is hoped that a student with a four years B.Sc. Environmental Science degree, after having the rigor of the courses outlined here, will feel adequately equipped to meet the challenges of career development. At the same time, there is sufficient content for those who wish to continue academic life at the University beyond the under-graduate level. Due care has been taken to maintain necessary academic

wholesomeness and depth in the course content so that the learning outcomes from these courses will lead to intellectual growth of a student. The need for a Basic course in Environmental Sciences is necessitated by our country's requirement and also the acceptability of the subject by young students from the view point of career opportunity. There is a demand for the subject in our country and as Educationists we have a societal obligation to meet such aspirations of the youths. It is equally expected that Environmental Science graduates will significantly contribute to the vision of 'Zero Defect, Zero Effect' policy initiative of Government of India.

2. Structure and Curriculum for Bachelor of Science (B.Sc.) In Environmental Science (Optional Subject)

(Choice Based Credit System)

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Choice Based Credit System (CBCS)Curriculum For Faculty of Science and Technology

Course Structure and Scheme of Examination

B.Sc. Three Year Undergraduate Degree Program

Semester I

	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I(DSC-1A) Core Courses	EVS-111	Core Course (Theory Paper-I) Foundation of Environment	45(3/week)	2	50	10	40	20
	EVS –112	Core Course (Theory Paper-II) Chemical Aspects of Environment	45(3/week)	2	50	10	40	20
	EVS -121	Lab course I (Based on EVS -111 and EVS-112)	45(3/week)	1.5	50	10	40	20
Ability Enhancement compulsory courses (AECC-1)	XXX-131	Communication skills in English-I	45(5/week)	3	50	10	40	20
	XXX-132	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-I)	45(4/week)	3	50	10	40	20
			225	11.5	250	50	200	100

Total Credits for Semester I: 11.5 (Theory :10; Laboratory:1.5)

Semester II								
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I(DSC-1B) Core Courses	EVS-211	Core Course (Theory Paper-III) Natural Resources Management	45(3/week)	2	50	10	40	20
	EVS-212	Core Course (Theory Paper-IV) Solid waste and Hazardous waste management	45(3/week)	2	50	10	40	20
	EVS -221	Lab course2 (based on EVS - 211 and EVS -212)	45(3/week)	1.5	50	10	40	20
Ability Enhancement compulsory courses (AECC-2)	XXX-231	Communication skills in English-II	45(5/week)	3	50	10	40	20
	XXX-232	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-II)	45(4/week)	3	50	10	40	20
Non-Credit Course	XXX-213	Constitution of India	45(3/week)	2*	50			
Non-Credit Course /additional credits	XXX-214	Compulsory Computer Course	45(3/week)	2*	50			
			225	11.5	250	50	200	100
Total Credits for Semester II: 11.5 (Theory :10; Laboratory:1.5)								

Semester III								
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Mark	CIA	UA	Min Marks
Optional I(DSC-1C) Core Courses	EVS -311	Microbiological aspects of Environment (Theory Paper-V)	45(3/week)	2	50	10	40	20
	EVS -312	Soil, Health and remediation measures (Theory Paper-VI)	45(3/week)	2	50	10	40	20
	EVS -321	Lab course 3 (Based on EVS -311)	45(3/week)	1.5	50	10	40	20
	EVS -322	Lab course 4 (Based on EVS -312)	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-1)	XXX-313	SEC-1 Any one skill to be chosen out of two SEC-1(A), SEC-1 (B)	45(3/week)	2	50	10	40	20
Ability Enhancement compulsory courses (AECC-3)	XXX-331	Communication skills in English-III	45(5/week)	3	50	10	40	20
	XXX-332	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-III)	45(4/week)	3	50	10	40	20
			315	15	350	70	280	140
Total Credits for Semester III: 15(Theory:12; Laboratory:3)								

Semester IV								
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I(DSC-1D) Core Courses	EVS-411	Air Pollution control technology (Theory Paper-VII)	45(3/week)	2	50	10	40	20
	EVS-412	Water Management (Theory Paper-VIII)	45(3/week)	2	50	10	40	20
	EVS-421	Lab course 5 (Based on EVS-411)	45(3/week)	1.5	50	10	40	20
	EVS-422	Lab course 6 (Based on EVS-412)	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-2)	XXX-413	SEC-2 Any one skill to be chosen out of two SEC-2(C), SEC-2(D)	45(3/week)	2	50	10	40	20
Ability Enhancement compulsory courses (AECC-4)	XXX-431	Communication skills in English-IV	45(5/week)	3	50	10	40	20
	XXX-432	Marathi/Hindi/Urdu/Sanskrit A student can opt for any one of these languages (SL-IV)	45(4/week)	3	50	10	40	20
Additional credits		Environmental Studies	45(3/week)	2*	50	10	40	20
			315	15	350	70	280	140
Total Credits for Semester IV: 15 (Theory:12; Laboratory:3)								

Semester V								
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I(DSE-1A) Discipline Specific Elective	EVS- 511	Water Pollution (Theory Paper-IX)	45(3/week)	2	50	10	40	20
	EVS- 512	Treatment Technology (Theory Paper-X)	45(3/week)	2	50	10	40	20
	EVS- 521	Lab course 7 (Based on EVS-511)	45(3/week)	1.5	50	10	40	20
	EVS- 522	Lab course 8 (Based on EVS-512)	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-3)	XXX-513	SEC-3Any one skill to be chosen out of twoSEC-3(E), SEC-3(F)	45(3/week)	2	50	10	40	20
			225	9	250	50	200	100
Total Credits for Semester V: 9 (Theory:06; Laboratory: 03)								

Semester VI								
	Course Code	Course Title	Total periods (Teaching periods/week)	Credits	Scheme of Examination			
					Max Marks	CIA	UA	Min Marks
Optional I(DSE-1B) Discipline Specific Elective	EVS-611	Environmental Toxicology (Theory Paper-XI)	45(3/week)	2	50	10	40	20
	EVS-612	Industrial and laboratory safety (Theory Paper-XII)	45(3/week)	2	50	10	40	20
	EVS-621	Labcourse9 (basedonEVS-611 & EVS-612)	45(3/week)	1.5	50	10	40	20
	EVS-622	Labcourse10 (Project work, Industrial Visit Report, Study Tour Report & Seminar)	45(3/week)	1.5	50	10	40	20
Skill Enhancement course (SEC-4)	XXX-613	SEC-4 Any one skill to be chosen out oftwoSEC-4(G), SEC-4(H)	45(3/week)	2	50	10	40	20
			225	9	250	50	200	100
Total Credits for Semester V: 09 (Theory:06; Laboratory: 03)								
Total Credits for three years: Sem I (11.5) + Sem II (11.5) + Sem III (15) +Sem IV (15) +Sem V (09) +Sem VI (09) =71Credits								

3. **Vision**
4. **Mission**
5. **Program Educational Objectives:**
6. **Programme Outcomes(Pos) and Programme Specific Outcomes:**
7. **Eligibility:**
8. **Duration**
9. **Medium of Instructions**
10. **Choice Based Credit System (CBCS) and Credit-to-contact hour Mapping:**
11. **Attendance:**
12. **Evaluation Methods/ Scheme of Examination, Earning Credits, Grading System**
13. **Curriculum for Semester I**
14. **Curriculum for Semester II**
15. **Curriculum for Semester III**
16. **Curriculum for Semester IV**
17. **Curriculum for Semester V**
18. **Curriculum for Semester VI**

Template for the designing curriculum of various courses/papers

Course Code and Course Title

Total Credits:02

Contact Hours: 30 (Clock Hours)

Marks:50

Periods: 45 (50 minutes each)

Learning Objectives of the Course

Learning Outcomes of the Course

Unit I:10 Periods Unit II:10

Periods Unit III:10

PeriodsUnitIV:10Periods

Unit V: Tutorials, seminars and Assignments (05periods)
References: Important Notes:

i) **Nomenclature**: DSC-Discipline Specific Core course, SEC–Skill Enhancement Course, AECC-Ability Enhancement compulsory course, DSE-Discipline Specific Elective, UA-University Assessment (Semester End), CIA-Continuous Internal Assessment

ii) **There shall be one skill enhancement course (SEC) IIIrd to VIth Semester (any one SEC course to be chosen (any one from three optional subjects) from the basket of SEC courses for the respective semester.**

iii) **Code description: EVS** code has to be decided by BOS of the respective subject while designing their respective curriculum (e.g. for Environmental Science it will be EVS)

- The codes for first semester courses will start from EVS-111, Second-semester courses will start from EVS-211 and so on
    - EVS111: The first digit indicates the Semester Number; the second two digits indicate paper numbers for the first-semester courses and the same analogy is for the remaining semesters
    - The codes for theory courses will start from EVS -111 (for the first semester and the same analogy is for the remaining semesters)
    - The codes for practical courses will start from EVS -121 (for the first semester and the same analogy is for the remaining semesters)
    - The codes for Ability Enhancement compulsory courses will start from EVS -131(for the first semester and the same analogy is for the remaining semesters)

iv) **Assessment**:80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)

v) **Continuous Internal Assessment (CIA): Theory** (10 Marks): Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two tests will be considered) and 05 Marks for Assignment / tutorials.

vi) **Continuous Internal Assessment (CIA): Practical** (10Marks): 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report

vii) **Practical examination:** Annual examination

B. Sc. III Year, Semester V

EVS-511: Water Pollution

(Theory Paper-IX)

Course Objectives

Students will be able to know

After studying the course, learners will be able to....

1: To know the basic concepts of water pollution.

2: To understand the water pollution.

3: To understand effects of water pollution.

4: To understand health impacts of water pollution

Unit-I: Introduction: - **(10)**

Water pollution meaning of the terms: Portability, Sewage, effluent, sample, contamination Eutrophication, pollution, Pollutants.

Sources of water pollution: Domestic, Industrial, Agricultural.

Unit-II: Types of water pollution **(10)**

Introduction, sources and effects of pollutants on aquatic flora and fauna.

-Freshwater pollution: Rivers, Ponds and Lakes.

-round water pollution

-Marine water pollution

Unit-III: Analysis of Water: **(10)**

- **Physical Parameters:** colour, Taste, Odour, Total Solids, Suspended Solids, Dissolved Solids, Turbidity.
- **Chemical Parameters:** pH, Hardness, Chlorides, Residual chlorine, Dissolved Oxygen, Biological Oxygen Demand, Chemical Oxygen demand, Oil and Grease, Ammonia, Nitrates, Sulphates, Phosphates

Unit-IV: Biological Parameters: **(10)**

-Planktons, Algae, - MPN/100 ml, IMVIC Test, SPC.

Quality of Water:

-Meaning of pure water -Standards of potable water

Unit – V: Tutorials, Seminars and Assignments **(05)**

- The codes for first semester courses will start from EVS-111, Second-semester courses will start from EVS-211 and so on
    - EVS111: The first digit indicates the Semester Number; the second two digits indicate paper numbers for the first-semester courses and the same analogy is for the remaining semesters
    - The codes for theory courses will start from EVS -111 (for the first semester and the same analogy is for the remaining semesters)
    - The codes for practical courses will start from EVS -121 (for the first semester and the same analogy is for the remaining semesters)
    - The codes for Ability Enhancement compulsory courses will start from EVS -131(for the first semester and the same analogy is for the remaining semesters)

iv) **Assessment**:80% for University Assessment (Semester End Examination) and 20 % for Continuous Internal Assessment (CIA)

v) **Continuous Internal Assessment (CIA): Theory** (10 Marks): Internal Test 05 Marks (Two Internal Tests of 05 marks each and average of the two tests will be considered) and 05 Marks for Assignment / tutorials.

vi) **Continuous Internal Assessment (CIA): Practical** (10Marks): 07 Marks for Internal Practical Examination and 03 Marks for record book/submission of collection and field survey report and excursion report

vii) **Practical examination:** Annual examination

Course Outcome

Students should able to:

4. Student will able to define water pollution.
5. Discuss the causes of water pollution.
6. Explain the types of water pollution.
7. State the disease caused by polluted water.

Reference books:

1. Environmental Science; By S.C. Santra, New Central Book Agency Pvt. Ltd. New Delhi.
2. A Tex book of Environmental Studies; By D. K. Astana, S. Chand and Company ltd. New Delhi.
3. A Tex book of Environmental Science; By R.N Trivedy, Anmol Publication Pvt. Ltd.
4. Water supply and sanitary Engineering; By S. C. Rangawala, Charotar publication House Anand.
5. Environmental Studies; By Dr. k. Mukkanti, S. Chand and Company PVT. Ltd. New Delhi.

B. Sc. III Year, Semester V

EVS-512: Treatment Technology

(Theory Paper-X)

Course Objectives

Students will be able to know

After studying the course, learners will be able to.....

1: To know the basic concepts of treatment technology.

2: To understand the waste water treatment methods.

3: To understand impacts of waste water.

Unit-I: Introduction: - **(10)**

Wastewater, Definition, Types and Sources of waste water,

Need of wastewater treatment, Collection of waste water

Unit-II: Principle, working mechanism, advantages and disadvantages of following Sewage treatment methods: (10)

Preliminary Treatment:

- Grit Chamber
- Skimming Tank
- Screening

Primary Treatment:

- Sedimentation (Clarifier)
- Coagulation (Chemical Precipitation Tank)

Unit-III: Secondary Treatment (Biological Treatment): **(10)**

- Aerobic: - Trickling filter
  Activated Sludge
  Oxidation Ponds and Lagoons
- Anaerobic: - Septic Tank
  Sludge digestion and Disposal

Unit-IV: Tertiary Treatment or Chlorination **(10)**

- Aim, Need, Dose of chlorine, Ozonation, Waste Purification Method:
- Collection of raw water
- Sedimentation, Coagulation, Filtration, Disinfection
-

Unit – V: Tutorials, Seminars and Assignments **(05)**

Course Outcome

Students should able to:

a. Students will be able to define the basic concepts of waste water treatment.
b. Will able to explain sewage treatment methods.
c. Will able to explain waste purification method.

Reference Books:

1. Water And Waste Water Engineering; By R. C. Rangwala.
2. Water And Waste Water Engineering (Vol II); By Fair/Geyer/Ocun.
3. A Test Book of Sanitary Engineering; By Vinayak Gharpure.
4. Waste Water Engineering; By Metcalf and Eddy. Inc Publications.
5. Chemical And Biological Methods for Water Pollution; By R. K Trivedy. And P. K. Goyel, Enviro Publication, Post Box No. 60 Karad.
6. Methodology For Water Analysis; By M.S. Kodarkar, IAAB Publications, Hyderabad 2006.
7. Water And Waster Water Analysis; By NEERI Publications, Nagpur.

B. Sc. III Year, Semester V

EVS-521: Lab Course –7

(Practical based on EVS-511)

1. Study of sampling techniques
2. Study of preservation of water samples
3. Determination of BOD of water sample
4. Determination of COD of water sample
5. Determination of Suspended solids of water sample
6. Determination of Dissolved Solids of water sample
7. Determination of Total Solids of water sample
8. Determination of Oil and Grease in polluted water
9. Determination of free CO2 in water sample
10. Estimation of abundance of Phytoplankton's from water sample
11. Quantitative techniques in aquatic microbiology – SPC
12. The presumptive, confirmatory and completed tests for determination of sewage contamination
13. Determination of Water Quality Index (WQI)

B. Sc. III Year, Semester V

EVS- 522: Lab Course –8

(Practical based on EVS-512)

1. Estimation of Sulfate from water sample
2. Estimation of Phosphates from water sample
3. Estimation of Nitrates from water sample
4. Estimation of Nitrites from water sample
5. Estimation of Ammonia in water sample
6. Determination of Conductivity of water sample
7. Jar Test demonstration
8. Determination of Chlorine by chloroscope
9. Determination of Redox potential of water sample
10. Determination of Hydrogen Suphide in sewage sample
11. Determination of dissolved oxygen from polluted water sample by using azide modification.
12. Determination of turbidity from given water sample

B. Sc. III Year, Semester VI

EVS-611: Environmental Toxicology

(Theory Paper-XI)

Course Objectives

Students will be able to know

After studying the course, learners will be able to.....

1: To know the basic concepts of Environmental Toxicology

2: To understand remedial measures of toxic substances

3: To understand toxicity assessment method

Unit I : Introduction **(10)**

Toxicology: Definition, Concept of Toxicology, Movement of Toxicants in the Environment, Classification of toxic substance i.e Toxic gases, Organic Poison, Inorganic Poison.

Unit II : **(10)**

a) Factors affecting Toxicity:
Chemical Factors: Polarity, Molecular weight, Nature of Chemical.
Biological Factors: Sex, Age, Body weight, Heredity and Genetic Characters.
b) Dose-response relationship
c) Acute exposure and chronic exposure

Unit III: Occurrence, Pollution sources, Uses, Effects & Remedial Measures of: (10)

a) Gases – CO, CO2, H2S, SO2, NO2
b) Heavy Metals – As, Pb, Hg, Cu

Unit IV: Environmental Toxicant – Occurrence, Sources, Their Effects and Remedial Measures of: **(10)**

a) Toxicants in water – Hydrocarbons in water,
b) Toxicants in soil – Pesticides
c) Toxicity Assessment Method, Lethal Concentration (LC), Lethal Dose (LD)

Toxicants in air – Atmospheric lead Carcinogenic, Chemistry of Carcinogenic Compounds, Carcinogens, Mutagens and Teratogens, Cancer Causing Agents- Drugs, Tobacco, Narcotics.

Unit V: Tutorials, Seminars and Assignments **(05)**

Course Outcome

Students should able to:

1. Students will know the basic concepts toxicology.
2. Will able to know the occurrence and remedial measures of toxic substances.
3. Explain the toxicity assessment method

Reference Books:

1. Environmental Toxicology; By M Satake, Y Mido, M.S Sethi.
2. Environmental Chemistry; By H. Kaur.
3. Environmental Chemistry; By A.K De.
4. Medical Jurispredence and Toxicology; By Parekh
5. Environmental Science; By Botkin and Killer
6. A Text book of Modern Toxicology, Ernest Hodgson, A JOHN WILEY & SONS, INC, Publications, New Jersey.
7. Basic Toxicology; By Frank C. Lu, Homisphere Publications Corporation, New York.

B. Sc. III Year, Semester VI

EVS-612: Industrial and laboratory safety

(Theory Paper-XII)

Course Objectives

Students will be able to know

After studying the course, learners will be able to.....

1: To know the basic concepts of Industrial Health and Safety.

2. To know the types of hazards and general safety rules

3. To know the principles of safety management.

Unit I: Introduction **(10)**

Introduction to Industrial safety, Need for integration of Environment, Health & Safety (EHS), Common safety tips – Personal protection, Lockout, Accident prevention sign, Occupational noise, Fire safety, Ladder safety.

Unit II: Industrial Safety: **(10)**

Introduction, Hazard Checklist – Housekeeping (Meaning & Methods), Machine hazards, Fire hazards, Personal Protective equipment's, Electrical equipment's, tools.

General Safety Rules.

Unit III: Safety Management **(10)**

- Safety management – Principles of safety management
- Fire preservation – Accident prevention (Principle, Basic terms)

Unit IV: Laboratory Safety **(10)**

(A) Definition, Laboratory safety methods: Personal Protective Measures like Gloves, Apron, mask, face shield, shoes etc. Handling of Chemicals, Instruments, Housekeeping. Fire Prevention, class of fires, types of fire extinguisher, different signs & symbol for chemical & instrument handling & prevention from hazard / accident.

(B) Laboratory waste management: Type of waste, storage, Handling, Disposal methods.

Characteristics of hazardous waste in laboratory: ignitability (flammable)

Reactivity, Corrosivity, Toxicity

Unit V: Tutorials, Seminars and Assignments **(05)**

Course Outcome

Students should able to:

1. Student will able to define water treatment
2. Discuss the waste water pollution.
3. Explain the types of waste water.

Reference books:

1) Industrial safety management' Hazard Identification and Risk control' Deshmukh L. M., Tata McGraw – Hill publishing company Ltd. New Delhi.

2) Industrial safety, health and environment management system 'Jain R. K., Rao Sunil, Khanna Publishers, Delhi.

3) 'Eco-Informatics' – wealth from waste, Vol. III Agarwal S. K., A.P. H. Publishing corporation, New Delhi.

4) 'Fundamentals of Environmental science' Dhaliwal G.S., Sangha G.S., Ralhan P.K., Kalyani Publishers, New Delhi.

5) 'Environmental Science' Santra S.C. ,New central Book Agency (P) Ltd. Kolkata.

6) Fundamentals of industrial safety and health Dr. K. U. Mistry, Siddhartha Prakashan, Janak society opp. Navrang High school, Ahmedabad -38001.

B. Sc. III Year, Semester VI

EVS- 621: Lab Course 9

(Practical based on EVS-611 & 612)

1. Estimation of Zn from provided contaminated water sample
2. Determination of iron content from contaminated water sample
3. Estimation of Pb from provided contaminated water sample
4. Estimation of Cu from provided contaminated water sample
5. Estimation of Mn from provided contaminated water sample
6. Effect of pesticides on seed germination
7. Effect of heavy metals on seed germination
8. To study the effects of gaseous pollutant SO2 on plant (Leaves and flowers)
9. To study the Accident prevention signs in Laboratory
10. To study General safety Rules for Laboratory
11. To study the Class of fire & types of extinguisher for Laboratory safety
12. Demonstration or Handling of fire extinguisher at emergency

B. Sc. III Year, Semester VI

EVS- 622: Lab Course 10

(Project work, Industrial Visit Report, Study Tour Report & Seminar)

Project work, Industrial Visit Report, & Seminar

1. **Project report**: One project: One project has to be completed during the third year as a part of practical paper of sixth semester Lab course 10. The project work is to be allotted during the fifth semester beginning along with the allotment of guide. As a part of project work, a field observation or the experimental work with specific aims and objectives can be given to the candidates. The data collection and preparation of review article on any specific topic by referring recent scientific literature can be a part of project work. The project report is to be submitted in triplicate before the semester end theory and practical examination of sixth semester. There will be 30 marks to the project out of total 50 marks.

2. **Industrial Visit Report:** At least one industrial visit is to be arranged during semester. The industrial visit report is to be submitted along with the project report.

3. **Study Tour Report**: The study tour is to be arranged for understanding the environment in total. The participation in study tour and industrial visit is compulsory. The study report is to be submitted.

4. **Seminar presentation:**

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Faculty of Science and Technology

Pattern of Practical question paper for practical examination

B.Sc III Year (Environmental Science)

SEM –V Course code No (EVS 521) and SEM –VI (EVS 621)

Time: 3 hrs **Total Marks: 80**

Batch No. **Date -**

Q.1) Determination of Dissolved Solids from given water sample 20

Or

Determination of Oil and Grease from given water sample

Or

Determination of BOD from given water sample

Or

Determination of COD from given water sample

Q.2) Estimation of Zinc (Zn) from provided contaminated water sample – 15

Or

Determination of Iron (Fe) content from contaminated water sample

Or

Estimation of Copper (Cu) from provided contaminated water sample

Or

To study the effect of pesticides on seed germination.

Q.3) Determination of free CO2 from given water sample 20

Or

Determination of Total Solids from given water sample

Or

To study the General Safety Rules for Laboratory

Or

To study the effects of gaseous pollutant SO_2 on plant (leaves and flowers)

Q.4) To study the various sampling techniques for collection of water samples 15

Or

To study the preservation of water samples

Or

To study the Class of fire and sampling types of extinguisher for Laboratory safety

Q.5) Record book and viva voce. 10

Grade

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Faculty of Science and Technology

Pattern of Practical question paper for practical examination

B.Sc III Year (Environmental Science)

SEM –V Course code No (EVS 522) and SEM –VI (EVS 622)

Time: 3 hrs **Total Marks: 80**

Batch No. **Date -**

Q.1) Estimation of Sulfate from given water sample — 20

Or

1. Determination of Conductivity of given water sample

Or

Estimation of Phosphate from given water sample

Or

Determination of Dissolved Oxygen from given water sample.

Q.2) Estimation of Ammonia from given water sample 15

Or

Determination of Turbidity from given water sample by using Nephlometer

Or

Determination of Conductivity from given water sample by using conductivity meter

Or

Determination of Chlorine from given water sample by using chloroscope

Q.3) Submission and presentation of;

a) Project work 20

b) Study Tour Report 10

c) Industrial Visit Report 05

d) Seminar presentation 05

Q.4) Record book and viva voce. 05

Dr.Babasaheb Ambedkar Marathwada University, Aurangabad

Faculty of Science and Technology

Pattern of Practical question paper for practical examination

B.Sc II Year (Environmental Science)

SEM –III Course code No (EVS 321) and SEM –IV (EVS 421)

Time: 3 hrs **Total Marks: 80**

Batch No. **Date -**

Q.1) To study the principle and applications of instruments used for microbiological study . (any Four) 20

Or

Study of bacteria by Grams staining method.

Or

To study the characters of bacteria by Simple staining method.

Q.2) To study the various equipments used for air pollution. (any three) 15

Or

Detection and identification of Pollen grains.

Or

Dust fall measurement by sedimentation method (by using tiles)

Q.3) Sterilization / preparation of the culture media. 20

Or

Detection of NH_3 gas and its effects on plant.

Or

Measurement of atmospheric temperature by using Psychrometer.

Q.4) To study the quality of water by MPN technique 15

Or

Detection of SO_2 gas and its effects on plant

Or

To Preparation of Potato Dextrose Agar (PDA) for Fungal species.

Q.5) Record book and viva voce. 10

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Faculty of Science and Technology

Pattern of Practical question paper for practical examination

B.Sc II Year (Environmental Science)

SEM –III Course code No (EVS 322) and SEM –IV (EVS 422)

Time: 3 hrs **Total Marks: 80**

Batch No. **Date -**

Q.1) Collection and preservation of soil samples. 20

Or

Determination of Lime by titration method.

Or

Determination of organic carbon from soil samples by Ignition / Walkey method.

Or

To study the water holding capacity of soil.

Q.2) Determination of Total Acidity of given water sample. 15

Or

Determination of Dissolved Oxygen content from given water sample .

Or

Determination of pH and temperature from given water sample.

Or

Determination for Total Alkalinity of given water sample

Q.3) Determination of Total Acidity from given soil sample. 20

Or

Determination of Total Alkalinity from given soil sample.

Or

Determination of Hardness from ground water sample.

Or

Determination of Chlorides from given water sample.

Q.4) Measurement of Noise by Noise meter (dB meter) 15

Or

Preparation of vermicompost bed for organic solid waste.

Or

Determination of Residual Chlorine from treated water sample.

Or

Study of endangered species i.e. wild animals (any three).

Q.5) Record book and Viva voce. 10