

॥ सा विद्या या विमुक्तये ॥



स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

“ज्ञानतीर्थ” परिसर, विष्णुपुरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

“Dnyanteerth”, Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade

ACADEMIC (1-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील द्वितीय वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०-२१ पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक २० जून २०२० रोजी संपन्न झालेल्या ४७व्या मा. विद्या परिषद बैठकीतील विषय क्र.११/४७-२०२०च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील द्वितीय वर्षाचे खालील विषयांचे C.B.C.S. (Choice Based Credit System) Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०२०-२१ पासून लागू करण्यात येत आहेत.

1. B.Sc.-II Year-Biophysics
2. B.Sc.-II Year-Bioinformatics
3. B.Sc.-II Year-Biotechnology
4. B.Sc.-II Year-Biotechnology (Vocational)
5. B.Sc.-II Year-Food Science
6. B.Sc.-II Year-Botany
7. B.Sc.-II Year-Horticulture
8. B.Sc.-II Year-Agro Chemical Fertilizers
9. B.Sc.-II Year-Analytical Chemistry
10. B.Sc.-II Year-Biochemistry
11. B.Sc.-II Year-Chemistry
12. B.Sc.-II Year-Dyes & Drugs Chemistry
13. B.Sc.-II Year-Industrial Chemistry
14. B.C.A. (Bachelor of Computer Application)-II Year
15. B.I.T. (Bachelor of Information Technology)-II Year
16. B.Sc.-II Year-Computer Science
17. B.Sc.-II Year-Network Technology
18. B.Sc.-II Year-Computer Application (Optional)
19. B.Sc.-II Year-Computer Science (Optional)
20. B.Sc.-II Year-Information Technology (Optional)
21. B.Sc.-II Year-Software Engineering
22. B.Sc.-II Year-Dairy Science
23. B.Sc.-II Year-Electronics
24. B.Sc.-II Year-Environmental Science
25. B.Sc.-II Year-Fishery Science
26. B.Sc.-II Year-Geology
27. B.Sc.-II Year-Mathematics
28. B.Sc.-II Year-Microbiology
29. B.Sc.-II year Agricultural Microbiology
30. B.Sc.-II Year-Physics
31. B.Sc.-II Year Statistics
32. B.Sc.-II Year-Zoology

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या www.srtmun.ac.in या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

‘ज्ञानतीर्थ’ परिसर,
विष्णुपुरी, नांदेड - ४३१ ६०६.
जा.क्र.: शैक्षणिक-१/परिपत्रक/पदवी-सीबीसीएस अभ्यासक्रम/
२०२०-२१/३३३

दिनांक : १५.०७.२०२०.

प्रत माहिती व पुढील कार्यवाहीस्तव :

- १) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- २) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- ३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
- ४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
- ५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
- ६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

स्वाक्षरित / -

उपकुलसचिव

शैक्षणिक (१-अभ्यासमंडळ) विभाग



**SWAMI RAMANAND TEERTH
MARATHWADA UNIVERSITY, NANDED**

**STRUCTURE OF CURRICULUM
B. Sc. II YEAR (ENVIRONMENTAL SCIENCE)**

W.E.F JUNE 2020

Distribution of credits for B.Sc. Environmental Science (Optional)
Under Faculty of Science
B. Sc. II Year Syllabus Structure
Semester Pattern Effective From June, 2020
Subject : Environmental Science

| B. Sc. II YEAR | | | | | | | | |
|-----------------------|---|--|-----------------------------------|----------------------|------------------------|------------------------------|----------------|---------------------|
| Se m | Paper No. | Name of the Course | Instru ction Hrs. / Week | Total Periods | Internal Evaluation | Marks of Semester Exam | Total Marks | Credits |
| III | CCENV III (Section A) | Atmosphere and global climate change (P – VI) | 03 | 45 | 10 | 40 | 50 | 02 |
| | CCENV III (Section B) | Water and Fresh water Resources (P – VII) | 03 | 45 | 10 | 40 | 50 | 02 |
| | SEC I | SEC I (01 Skill Paper) | 02 | 30 | 25 | 25 | 50 | 02* |
| IV | CCENV IV (Section A) | Environmental Pollution and Human Health (P – VIII) | 03 | 45 | 10 | 40 | 50 | 02 |
| | CCENV IV (Section B) | Natural resource Management (P – IX) | 03 | 45 | 10 | 40 | 50 | 02 |
| | CCENV II (CCENV III) (Sec A & B) | Practical's based on Paper No. CCENV III (Section A & B) (P – X) | 04 | 20 Practic als | 10 | 40 | 50 | 02 |
| | CCENV III (CCENV I V) Section A & B) | Practical's based on Papers CCENV IV (Section A & B) (P – XI) | 04 | 20 Practic als | 10 | 40 | 50 | 02 |
| | SEC - II | SEC II (01 Skill Paper) | 02 | 30 | 25 | 25 | 50 | 02* |
| Total Credits | | | | | | | | 12 (04*) |

B. Sc. II Year Syllabus
Subject : Environmental Science
Semester Pattern Effective From June, 2020

Swami Ramanand Teerth Marathwada University, Nanded

Choice Based Credit System (CBCS) Course Structure (New Scheme)

B. Sc. II Year (Semester III)

Semester Pattern with effect from June 2020

ENVIRONMENTAL SCIENCE

(CCENV III – Section A)

Core Course VI : ATMOSPHERE AND GLOBAL CLIMATE CHANGE (Paper – VI)

Credits : 02

Marks : 50

Periods : 45

Preamble: The paper deals with dynamics of atmospheric processes, which include its composition, meteorological phenomena and atmospheric chemistry. The paper also highlights the anthropogenic intervention in 'anthropocene', which has led to global climate change. The paper also explores effects of global changes on human communities and initiatives taken at global and regional levels to combat them.

Unit-I: Atmospheric processes (15)

Introduction to evolution of atmosphere, structure and composition of atmosphere, earth radiation/heat budget, earth energy balance, forms of energy, energy transfer in atmosphere, particle, ion and radical in the atmosphere, photochemical reactions in atmosphere, difference between weather and climate; factors affecting weather and climate, sinks of atmosphere, movement of air masses.

Unit-II: Air Pollution (15)

Ambient air quality monitoring and standards (National ambient air quality standards of India), Air quality index, Sources and types of air pollutants, sources and types of pollutants (Primary & Secondary), Smog a case study Effects of different pollutants on human health (NO_x, Sox, PM, CO, CO₂, Hydrocarbons) and control measures.

Unit-III: Climate change and control policy (15)

Concept of Climate change; causes of climate change: **Natural and anthropogenic factors:** continental drift, variation of the earth orbit, volcanic activity, ocean current; Greenhouse gases, change in land use pattern, atmospheric aerosols. **Impact of climate change:** rise in atmospheric temperature, rise in sea level, ocean warming, ocean acidification, health issues. Introduction to carbon foot print and its role in global climate change; Ozone layer depletion causes and mitigation measures. **Environmental conventions:** Montreal protocol, Kyoto protocol, Carbon credit and trading. convention on climate change.

Suggested Readings:

01. Air Pollution and its control:Sumitmalhotra (Pointer publishers, Jaipur)
02. Air Pollution: M. N. Rao (Tata McGraw – Hill publishing company, New Delhi)
03. Air Pollution:B. K. Sharma, H. Kaur (KrishnaPrakashan media, Meerut)
04. Air Pollution: S. K. Agarawal(A. P. H. Publishing corporation, New Delhi)
05. Air Pollution: V. P. Kudesia(PragatiPrakashan, Meerut).
06. Environmental Chemistry :B.K.Sharma& H. Kaur Pragati Publication, Meerut
07. Atmosphere, Weather &Climate :K.Sidhanatha; Kisalaya Publications, Pvt. Ltd.
08. Fundamentals of Environmental Science : G. S.Dahliwal, G. S. Sangha, P. K. Ralhan, Kalyani Publishers, New Delhi.
- 09.Textbook of Environmental Studies for Undergraduate Courses: ErachBharucha (Universities Press), 2013.
10. Introduction to Environmental Science: Y. Anjaneyulu (B.S. Publication), 2008.
11. Environmental Science: UGC NET/SET (Danika Publishing Company), 2018.

Learning Outcomes

01. Gain the knowledge of structure and composition of the Atmosphere and its various processes.
02. Understand the issues of air pollution in context to its sources, effects and control measures.
03. Acquire knowledge about climate change issue in context with its phenomenon, causes, effects and control measures.
04. Understand the efforts taken at international level to cope with the issue of climate change by adopting several protocol / agreements.

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. II Year (Semester III)
Semester Pattern with effect from June 2020
ENVIRONMENTAL SCIENCE
(CCENV III – Section B)
Core Course VII : WATER AND FRESH WATER RESOURCES (Paper – VII)

Credits : 02

Marks : 50

Periods : 45

Preamble : The course deals with Fresh water resources such as surface and ground water resources, Properties of potable water, and water conservation methods. The students are expected to identify the sources of water, their quality with respect to pot ability and methods of water conservation.

Unit-I: Introduction To Fresh Water: (15)

Hydrological cycle, Precipitation, Runoff, Infiltration, evaporation, evapo transpiration; Measurement of rain fall.

Fresh Water : Definition, Scope, Importance and need for fresh water management. Global distribution of fresh water, Limits of global fresh water resources. Freshwater resources of India, Aquifer, Aquifer systems in India, Surface sources, Underground water resources.

Unit-II: Properties of water: (15)

Physical Properties: Temperature, specific gravity, Viscosity, thermal conductivity, surface tension, Transparency, Color, Odor, Turbidity, Conductivity, Total Dissolved Solids and Total Suspended Solids; **Chemical Properties:** Chlorides, Salinity, pH, DO, CO₂, COD, BOD, Acidity Alkalinity, Nitrogen & its compounds, **Biological Properties:** Phytoplankton, Zooplankton, Macro-invertebrates and Microbes, Coli forms,MPN, Water quality standards in India.

Unit-III Water Use and Conservation Methods: (15)

Uses of water : Domestic uses, Civic or public purpose, Industrial purpose, Business or trade purpose, Agricultural purpose, Navigation, Hydroelectric power generation, Recreation, Factors affecting water use, loss and waste. **Water conservation methods :** Rain water Harvesting, Techniques for ground water recharge, Importance of watershed and watershed management; National water policy.

Suggested Readings :

- 01. Water Supply and Sanitary Engineering:**S. C. Rangwala, R. C. RangwalaCharotar Publishing House Anand.
- 02. Environmental Science :** Nabel and Wright , Prentice Hall, New Jersey
- 03. Environmental Chemistry:**B. K. Sharma Goel Publishing House, Meerut.
- 04. Water and Hydrology :** Peter B. black,
- 05. Environmental Science :** Enger Smith, Smith, W. M. C. Brown , Company Publishing
- 06. Water Supply :** Alan C. Twort, Don D. Ratnayaka,(IWA Publishing, New Delhi
- 07. Water Pollution :** B. K. sharma, Dr. H. Kaur Krishna PrakashanMandir, Meerut
- 08. Water Supply and Pollution Control :** Warren Wiessman, Jr. Mark J. Hammer AWL Publishers, California
- 09. Water and Waste Water Technology :** Mark J. Hammer, Mark J. hammer Jr. Prentice Hall of India Pvt,Ltd., New Delhi
- 10. A textbook of Environmental Studies :** G. R. Chatwal, Harish Sharma, Himalaya Publishing House, New Delhi
- 11. Environment Problems & Solutions :** D. K. Asthana, MeeraAsthana, S. Chand& Co., New Delhi,1998
- 12. Water Supply and Pollution Control :** Warren Viessman, Jr. Mark J. Hammer, Addison – Wesley California, 1999

Learning Outcomes

01. Acquire knowledge about the water resources with its sources and types.
02. Gain knowledge regarding the physico-chemical properties of water .
03. Understand the importance of water resources in overall development process.
04. Understand the water conservation methods.

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. II Year (Semester III)
Semester Pattern with effect from June 2020
ENVIRONMENTAL SCIENCE
SEC I : Soil Testing Analyst

Credits : 02*

Marks : 50

Periods : 30

Objectives of Course: To provide soil testing analyst for scientific farming with formalized way to build fundamental knowledge and skill in areas of soil sciences.

Course Content:

Physical properties of Soil : Density, Porosity, Permeability, Temperature, Soil water, Soil atmosphere **Chemical properties of Soil :** Hydrogen ion concentration, Organic matter, Inorganic elements; Soil fauna and Soil flora; **Agents of soil Erosion :** Running water, Glaciers, Wind, Sea water, Deforestation and Overgrazing; **Types of erosion :** Sheet erosion, Rill erosion, Gully erosion, Slip erosion (land slide), Wind erosion. **Soil conservation practices:** chemical and physical characteristics of soils, Classification and Morphology, how soil is formed and soil conservation.

The Course Context:

- Soil testing analyst are often responsible for setting up testing equipments.
- Need to be able to make their way through different types of ground to get their testing sites.
- Practical's to be covered are justifying the syllabus like color, temperature, density, consistency, micro and macro nutrients with N.P.K.
- Need to be able to meet with clients or team members at the site or testing facility
- Soil testing technicians must be able to work well as part of a team of other technicians and scientists. They must also be good listeners so they can carefully follow directions to help them avoid making procedural mistakes. Coursework in written and oral communication can also help students gain the skills they need to file written reports on their findings. Analyst is expected to writing reports, maintaining libraries and databases of information, preparing notes and surveying for natural resources, and these tasks are carried out in offices and labs, as well as in the field. On-site work can take extended periods of time and may need to be conducted regardless of weather conditions.

Suggested Readings:

- The Nature and Properties of Soils (Brady and Weil; Pierson/Prentice Hall Publisher) The current edition is the 14th edition.
- website: <https://www.soils.org/files/certifications/fundamentals-exam-objectives.pdf>
- Hand Book of Methods in Env. Studies by S.K. MAITI ABD Publishers, Jaipur, India 81-85771-58-8
- Environmental Science Principle & Pract. R.C. Das & Behera Prentice Hall of India Pvt. Ltd. New Delhi 978-81-203-3330-7

Learning Outcomes

01. Acquire the skill of soil testing.
02. It helps to get knowledge of equipments required for soil testing.
03. This course helps to file written reports on their findings of soil testing.
04. This course gives the skill of survey, Laboratory analysis, and interpretation of results

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. II Year (Semester IV)
Semester Pattern with effect from June 2020
ENVIRONMENTAL SCIENCE
(CCENV IV – Section A)

Core Course VIII : ENVIRONMENTAL POLLUTION AND HUMAN HEALTH (Paper – VIII)

Credits : 02

Marks : 50

Periods : 45

Preamble: This paper deals with different aspects of environmental contamination, which have adverse effects on human health. It will lay emphasis on understanding mechanisms of pollutants impacting human health by developing an understanding of different types of pollutants, their sources and mitigation measures. The students will also be introduced to the concept of permissible limits.

Unit 1: Water pollution

(15)

Sources of surface and ground water pollution; water quality parameters and standards; organic waste and water pollution; Eutrophication; Effect of water contaminants on human health (nitrate, fluoride, arsenic, chlorine, cadmium, mercury, pesticides); water borne diseases. **Marine Pollution-** Sources of marine pollution; oil spill and its effects; existing challenges and management techniques (planning, construction, environmental monitoring of coastal zones).

Unit 2: Noise and Radioactive Pollution

(15)

Noise pollution- sources; frequency, intensity and permissible ambient noise levels; effect on communication, impacts on life forms and humans: Physiological and Psychological.
Radioactive Pollution : Definition, Sources and Effects on Human health.

Unit 3: Soil and Solid Waste pollution

(15)

Soil Pollution- Causes of soil pollution; effect of soil pollution on environment, vegetation and human beings; control strategies. **Solid Waste Pollution-** Introduction, characteristics of solid wastes, effect of solid waste pollution on human health : leachate, groundwater contamination, vector born diseases, odor, nuisance etc.

Suggested Readings:

- 01. Air Pollution:** M. N. Rao, (Tata McGraw- Hill publishing company. New Delhi)
- 02. Air Pollution:** B.K. Sharma, H.Kaur (Krishna Prakashan media, Meerut)
- 03. Air Pollution:** V.P. Kudesia (Pragati Prakashan, Meerut)
- 04. Air Pollution:** B.K. Sharma, H.Kaur (Krishna Prakashan media, Meerut)
- 05. Air Pollution:** S.K. Agarwal (A.P.H. Publishing Corporation, New Delhi)
- 06. Environmental Chemistry:** A.K. De (Wiley eastern limited, New Delhi)
- 07. Water Pollution:** V.P. Kudesia (Pragati Prakashan, Meerut)
- 08. Water Supply & sanitary Engineering:** R.C. Rangwala and S.C.Rangwala (Charotal publishing house, Anand)
- 09. Principles of Environmental Biology:** P. K. G. Nair (Himalaya Publishing House, New Delhi.
- 10. Environmental Biology:** M. P. Arora (Himalaya Publishing House, New Delhi)
- 11. Environmental Science:** Enger Smith, Smith, W. M. C. Brown (Company Publishing)
- 12. Introduction to Environmental Studies:** Turk & Turk
- 13. Conservation of Natural resources:** David A. Castillan
- 14. Fundamentals of Environmental Science :** G. S. Dahliwal, G. S. Sangha, P. K. ralhan, Kalyani Publishers, New Delhi
- 15. Environmental chemistry:** B. K. Sharma (Goel publishing house, Meerut)
- 16. Solid Waste Management :** Amul Late & Mahadeo Mule (Lambert Academic Publishing, Mauritius, 2020)

Learning Outcomes

01. Acquire the scientific knowledge about the various Environmental pollution.
02. Understand the effect of Environmental pollution on human health.
03. Ability to develop mitigation measures to combat with the challenge of Environmental pollution.

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. II Year (Semester IV)
Semester Pattern with effect from June 2020
ENVIRONMENTAL SCIENCE
(CCENV IV – Section B)
Core Course IX : NATURAL RESOURCE MANAGEMENT (Paper – IX)

Credits : 02

Marks ; 50

Periods : 45

Preamble: This paper takes an objective view of the nature of Earth's resources, their generation, extraction and impact of human activities on earth's environment. The students are expected to understand effective management strategies. It aims to provide an idea of effective management strategies and a critical insight of the major sustainability issues.

Unit I: Introduction to Natural Resources: (15)

Definition, Introduction, Classification, renewable and non-renewable resources; Depletion of Natural Resource-Causes, Impacts and mitigation measures; Importance of Natural resources in Limitations of non-renewable resources; Limitations of renewable resources; Man and the global resources. Human life, Role of Individual in Natural resource management.

Unit II: Energy and Mineral Resources (15)

Conventional Energy resources: Coal, Oil, Petroleum and natural gas, Nuclear energy, Energy Scenario in India, Uses and Management of Conventional Energy resources. **Non-Conventional Energy resources:** Solar energy, Hydro energy, Tidal energy, Biomass energy, Wind energy, Geothermal energy, Uses and Management of Non-Conventional Energy resources. Energy resources options and limitations, Indian renewable energy program. **Mineral Resources:** Definition, Minerals in India Iron, Manganese, Bauxite, Copper, Gold], Uses of Minerals, Management of Minerals.

Unit III: Biotic Resources (15)

Forest resources: Uses of forest resources, wood products, wood consumption, wood demand, Non wood products, trade of forest products, Forest and Environment, deforestation, afforestation, Social forestry, Medical forestry, Forest management, National forest policy. **Wild life resources:** wild life and environment, endangered species, causes of depletion of Wild life, wild life trade, uses of wildlife (positive value and negative value), wild life conservation and management.

Suggested Readings :

- 1) **Principles of Ecology:** P. S. Verma, V. K. Agarwal (S. Chand and Co. New Delhi)
- 2) **Environmental Management:** Sandeep Joshi (shrishti Eco – Research Institute, Pune)
- 3) **Environmental Biology:** P. D. sharma (Rastogi Publications, Meerut)
- 4) **Ecology and Environment:** P. D. sharma (Rastogi Publications, Meerut)
- 5) **Principles of Environmental Biology:** P. K. G. Nair (Himalaya Publishing House, New Delhi.
- 6) **Environmental Biology:** M. P. Arora (Himalaya Publishing House, New Delhi)
- 7) **Environmental Science:** Enger Smith, Smith, W. M. C. Brown (Company Publishing)
- 8) **Introduction to Environmental Studies:** Turk & Turk
- 9) **Conservation of Natural resources:** David A. Castillan
- 10) **Fundamentals of Environmental Science :** G. S. Dahliwal, G. S. Sangha, P. K. ralhan, Kalyani Publishers, New Delhi
- 11) **Environmental chemistry:** B. K. Sharma (Goel publishing house, Meerut)
- 12) **Environmental Science:** Enger Smith, Smith, W. M. C. Brown (Company Publishing)
- 13) **Forests in India:** V. P. Agrawal Oxford & IBH Publishing company Pvt. Ltd., New Delhi), 1988
- 14) **Plant ecology and Soil Science:** R. S. Shukla, P. S.Chandel , (S. Chand and company Ltd., New Delhi), 2001.
- 15) **Textbook of Environmental Studies for Undergraduate Courses:** Erach Bharucha (Universities Press), 2013.
- 16) **Introduction to Environmental Science:** Y. Anjaneyulu (B.S. Publication), 2008.
- 17) **Environmental Science:** UGC NET/SET (Danika Publishing Company), 2018.

Learning Outcomes

01. Acquire knowledge about the various natural resources, their uses and management .
02. Understand the importance of resource management to achieve the goals of sustainability.
03. Application of resource management practices for planning and decision making.
04. Provide opportunity to think on linkage between resources in environment and process of development

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. II Year (Semester IV)
Semester Pattern with effect from June 2020
ENVIRONMENTAL SCIENCE
(CCENV PII – Paper X)
Core Course X : Practical's Based on Paper VI, VII, (Paper – X)

Credits : 04

Marks : 40

Periods : 04 Periods per week

Annual practical paper is Based on **CCENV VI & VII**

01. Study of Micro-meteorological instruments (Rain Gauge, Psychrometer, Wind Anemometer, Lux meter, Barometer).
02. Study of Rotorod Air Sampler and Tilak Air Sampler.
03. Study of Collection mechanism (Adsorption and Absorption) and sampling devices for gaseous pollutants
04. Measurement of rain fall by rain gauge.
05. Determination of wind velocity by anemometer.
06. Determination of wind direction by wind vane.
07. Determination of atmospheric pressure by using Barometer.
08. Dust fall measurement by tiles exposure method.
09. Determination of Carbon Di Oxide (CO₂) by Zincondroff Technique.
10. Detection of SO₂ from ambient air.
11. Detection of H₂S from ambient air.
12. Detection of Ammonia from ambient air.
13. Study the effect of So₂ on Plants.
14. Study the effect of H₂S on Plants.
15. Study the effect of Ammonia on Plants.
16. Interpretation of wind rose diagram.
17. Determination of Air pollution index.
18. Estimation of Suspended Particulate Matter (SPM) by HVAS
19. Estimation of Respirable Suspended Particulate Matter (RSPM) by HVAS
20. Determination of Noise level by dB meter.

Learning Outcomes

01. Acquire knowledge about the working of various meteorological Instruments, Air samplers, and sampling devices for gaseous pollutants.
02. To get the practical skill of estimation of various air pollutants.
03. Practical experience of the effect of various air pollutants on plants.
04. Study of various experiments related to Air pollution management.

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. II Year (Semester IV)
Semester Pattern with effect from June 2020
ENVIRONMENTAL SCIENCE
(CCENV PIII – Paper XI)
Core Course XI : Practical's Based on Paper VIII, IX, (Paper – XI)

Credits : 04

Marks : 40

Periods : 04 Periods per week

Annual practical paper is Based on **CCENV VIII & IX**

01. Collection of Water Sample
02. Preservation of Water Sample
03. Determination of pH from provided water sample
04. Determination of Turbidity from provided water sample by Turbidity meter.
05. Determination of conductivity from provided water sample by conductivity meter.
06. Determination of Redox potential of provided water sample.
07. Determination of Total solids from provided water sample.
08. Detection of Coli form bacteria by IMVC test.
09. Most Probable Number (MPN) test.
10. Determination of soil conductivity.
11. Determination of Sodium from soil sample.
12. Determination of specific gravity of soil.
13. Determination of carbonates and Bicarbonates from soil sample.
14. Study of Vegetation density by quadrant method.
15. Study of vegetation frequency by quadrant method.
16. Study of soil pollution Index
17. Determination of water quality Index.
18. Determination of moisture content of Municipal solid waste.
19. Study of International and National standards of Air and Water pollution.
20. Visit to Natural water source / National Park / Wild life Sanctuary / Social Forestry Project / Forest or Wildlife Department

Learning Outcomes

01. Acquire knowledge about the Collection and preservation of water samples.
02. Gain practical knowledge regarding determination of the physico-chemical and microbiological properties of water.
03. Gain practical knowledge regarding various soil testing parameters.
04. Study the management of various National Park / Wild life Sanctuary / Social Forestry Project by field visit.

Swami Ramanand Teerth Marathwada University, Nanded
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. II Year (Semester IV)
Semester Pattern with effect from June 2020
ENVIRONMENTAL SCIENCE
SEC II : Training course for water Quality Assessment

Credits : 02*

Marks : 50

Periods : 30

Objectives: The main objective of course is to improve the awareness and skills of the students in modern techniques of analysis of water for research and extension activities. Use of instruments and their general upkeep / maintenance, interpretation of analytical data and formulation of reports / recommendations...

Course contents: Sources of water, distributions and types of water, various physico-chemical and biological characteristics of water, water conservation practices, water Acts etc

The course context:

- Collect samples in scientific way from residential plumbing and municipal distribution systems for analysis
- Take physical tests like (Colour, pH, Temp etc) at the spot and use preservatives for further analysis
- Conduct chemical tests of samples in lab (e.g. Alkalinity, Hardness, TDS, DO, COD, fluoride and some heavy metals as possible as.
- Conduct biological tests of samples like MPN, SPC, Faecal and non-faecal coliform
- To conduct chlorine residual or turbidity tests
- Compare the obtained values with WHO, CPCB or BSI standards

Suggested Readings :

- Hand Book of Methods in Env. Studies by S. K. MAITI, ABD Publishers, Jaipur, India.
- Instrumental Methods of Chemical Analysis G. R. Chatwal and Anand Himalaya Publishing house, New Delhi.
- Environmental Science Principle & Pract. R. C. Das & Behera Prentice Hall of India Pvt. Ltd. New Delhi

Learning Outcomes

01. Acquire the skill of water quality testing.
02. It helps to get knowledge of equipments required for water quality testing.
03. This course helps to file written reports on their findings of water analysis .
04. This course gives the skill of survey, Laboratory analysis and interpretation of results



SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Practical Examination – Summer 20

Class : B. Sc. II Year

Paper No. : CCENV VI & VII

Date :

Center :

Subject : Environmental Science

CCENV – II (P-X) Laboratory Course

Time : Three Hours

Maximum Marks : 40

| | | |
|--------|---|----|
| Q. 1 : | Determination of Co ₂ from air / Detection of So ₂ from air / Detection of H ₂ S from air / Detection of Ammonia from air | 15 |
| | OR | |
| | Study the Effect of So ₂ / H ₂ S / Ammonia on Plant material | |
| | | |
| | | |
| Q. 2 : | Dust fall measurement by tiles exposure method / Interpretation of wind rose diagram / Determination of Air pollution index | 15 |
| | OR | |
| | Estimation of Suspended Particulate Matter (SPM) by HVAS / Estimation of Respirable Suspended Particulate Matter (RSPM) by HVAS | |
| | | |
| | | |
| Q. 3 : | Measurement of rain fall by rain gauge / Determination of wind velocity by anemometer./ Determination of wind direction by wind vane / Determination of atmospheric pressure by using Barometer | |
| | OR | |
| | Determination of Noise level by dB meter / Study of Rotorod Air Sampler / Tilak Air Sampler / Study of Collection mechanisms Adsorption and Absorption / Study of sampling devices for gaseous pollutants. | 10 |

Internal Examiner

External Examiner



SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

Practical Examination – Summer 20

Class : B. Sc. II Year

Paper No. : CCENV VIII & IX

Date :

Center :

Subject : Environmental Science

ENVP – III (P-XI) Laboratory Course

Time : Three Hours

Maximum Marks : 40

| | | |
|--------|--|----|
| Q. 1 : | Determination of soil conductivity / Determination of Sodium from soil sample / Determination of specific gravity of soil | 15 |
| | OR | |
| | Study of Vegetation density by quadrant method / Study of vegetation frequency by quadrant method / Study of soil pollution Index / Determination of moisture content of Municipal solid waste | |
| | | |
| | | |
| Q. 2 : | Determination of carbonates and Bicarbonates from soil sample / Study of International and National standards of Air and Water pollution / | 15 |
| | OR | |
| | Determination of Total solids from provided water sample / Detection of Coli form bacteria by IMVC test / Most Probable Number (MPN) test. / Determination of water quality Index | |
| | | |
| | | |
| Q. 3 : | Preservation of Water Sample / Determination of pH from provided water sample / Determination of Turbidity from provided water sample by Turbidity meter | |
| | OR | |
| | Determination of Redox potential of provided water sample / Determination of conductivity from provided water sample by conductivity meter | 10 |

Internal Examiner

External Examiner

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