Swami Ramanand Teerth Marathwada University, Nanded.

CBCS Pattern

B. Sc. First Year

(Semester I & II)

ENVIRONMENTAL SCIENCE

W.e.f: June, 2016

Distribution of credits for B.Sc. Environmental Science (Optional)

Under Faculty of Science

B. Sc. Syllabus Structure

Semester Pattern Effective From June, 2016

Subject: Environmental Science

Total Credits Semester I and II: 12

Semester	Paper No.	Name of the Course	Instruction Hrs/ week	Total Period	Internal Evaluatio	Marks of Semester	Total Marks	Credits
I	CCENV I (Section A)	Fundamentals of Environmental Science (P-I))	03	45	10	40	50	2
	CCENV I (Section B)	Freshwater Sources and Uses (P-II)	03	45	10	40	50	2
II	CCENV II (Section A)	Environmental Ecology (P-III)	03	45	10	40	50	2
	CCENV II (Section B)	Fresh Water Treatment (P-IV)	03	45	10	40	50	2
	CCENVP I [CCENV I & II (Section A & B)]	Practical's based on Section A & Section B of CCENV I & CCENV II (P-V)	04	20 Practical	20	80	100	4
III	CCENV III (Section A)	Basic concepts in Environmental Microbiology(P- VI) (P-VI)	03	45	10	40	50	2
	CCENV III (Section B)	Air Pollution and Meteorology(P-VII)	03	45	10	40	50	2
	CCENVP II [CCENV III & IV (Section A)]	Practical's based on P-VI & P-VIII (P-X)	04		10	40	50	2
	CCENVP II [CCENV III & IV (Section B)]	SEC I (1 Skill/ optional)			15×3 = 45	-	-	(02)*
IV	CCENV IV (Section A)	Applied Environmental Microbiology (P-VIII)	03	45	10	40	50	2
	CCENV IV (Section B)	Air and Noise Pollution Control (P-IX)	03	45	10	40	50	2
	CCENVP III [CCENV III & IV (Section B)]	Practical's based on P-VIII & P-IX (P-X)	04	20 practical	10	40	50	2
	CCENVP III [CCENV III & IV (Section B)]	SEC II (1 Skill / Optional) P-XI			15×3 = 45	-	-	(02)*
							Total Credits Semester III and	12(04)*

Semester	Course No.	Name of the Course	Instruction Hrs/ week	Total Period	Internal Evaluation	Marks of Semester	Total Marks	Credits
V	DECENV I (Section A)	Water Pollution and Waste Water Analysis (P-XII)	03	45	10	40	50	2
	DECENV I [(Section B) Elective-1]	Environmental Instrumentation – I (P-XIII)	03	45	10	40	50	2
	DECENVI (SectionB) Elective-II	Environmental Education and Biodiversity P-XIV	03	45	10	40	50	2
	DECCENVP I [DECMB I & II	Practical's based on P- XII XIII & PXIV(P-XVI)	04	20 Practical	10	40	50	2
VI	DECENVP II [DECMB I& IV	SEC III (1 Skill/ optional)			15×3 = 45	-	-	(02)*
	DECENV II (Section A)	Waste water Engineering P-XVI)	03	45	10	40	50	2
	DECENV II [(Section B) Electivel]	Environmental Instrumentation-II (P-XVII)	03	45	10	40	50	2
	DECENV II [(Section B) ElectiveII]	Environmental Management	03	45	10	40	50	2
	DECENVP II) [DECENV I & II (Section B)]	Practical's based on P- XIII & P-XIV (P-XVII)	04	20 Practical	10	40	50	2
	DECENVP II(Section B)	SEC IV (Project))			5O	-	50	(2)*
Total Credits Semester V and VI								12(04)*

B. Sc. First Year (Semester - I)

Semester Pattern Effective From -2016

ENVIRONMENTAL SCIENCE

CCENV I (Section A)

Fundamentals of Environmental Science (P-I)

Credits: 02 (Marks: 50) **Periods: 45**

UNIT I: Introduction **10**

1.1 Evolution of Universe.
1.2 Evolution of Elements,
1.3 Origin of life and Evolution of life forms: Fossils
1.4 Origin of life Chemical basis.
1.5 Evolution of life forms through ages

UNIT II: Biogeochemical Cycles **10**

2.1 Concept and Scope of environment,.
2.2 Global environmental problems.
2.3 Need of Environmental awareness,
2.4 Nitrogen, Carbon, Oxygen, phosphorus and Sulphur.

UNIT III: Biosphere and its omponents **15**

2.1 Definition of Biosphere
2.2 Components of biosphere
2.3 Atmosphere: Troposphere, Stratosphere, Mesosphere, Ionosphere, Exosphere.
2.4 Composition of air
2.5 Lithosphere: Definition; Types of rocks Process of soil formation: Physical weathering, Chemical weathering Climate and soil types, Color and Morphology of soil, Soil profile.
2.6 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
2.7 Soil erosion: Agents of soil erosion: Running water, Glaciers, Wind, Sea water, Deforestation and Overgrazing; Types of erosion: Sheet, Rill Gully, Slip erosion (land slide), Wind erosion; Soil conservation

UNIT IV: Wild Life **10**

4.1 Definition
4.2 Wild life in India; Necessity for wild life conservation
4.3 Modes of wild life conservation
4.4 National parks: Tadoba, Corbett, Borivli, Kanha, Ranthambor; Sanctuaries: Kaziranga, Bharatpur, Gir, Periyar.

Swami Ramanand Teerth Marathwada University Nanded

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

B. Sc. First year (Semester- I)

Semester Pattern effective from June -2016

Environmental Science

CCENV I (Section B)

Fresh Water: Sources and Uses (P-II)

Credits: 02 (Marks: 50) **Periods: 45**

UNIT I: Hydrosphere **10**

1.1 Definition, Physical properties of water: Temperature, Specific gravity. Viscosity, Thermal conductivity, Expansion before freezing, Surface tension, Solvency, Buoyancy, Transparency, Pressure

1.2 Chemical properties of water: Salinity, Solubility of gases, Oxygen, Carbon dioxide, Nitrogen Hydrogen Ion Concentration, Hydrogen Sulphide, Hydrological Cycle

1.3 Clouds**:** Definition, Mechanism of Cloud Formation, Classification of Clouds, Role of Clouds in Weather Forecasting,

UNIT II: **Freshwater** **10**

2.1 Freshwater, Definition, Scope, Importance and need for Freshwater management,

2.2 Global Distribution of fresh water,

2.3 The limits of global fresh water resources, Freshwater resources of India,

2.4 Quality of surface water, Water quality in flowing waters;

2.5 Rainwater harvesting; Self purification of rivers; Eutrophication and its Remedial measures.

UNIT III: Sources of Water **15**

3.1 Natural Water Resources types: Rainfall and runoff : precipitation, rain and snow fall water,

3.2 Measurement of rainfall,

3.3 Surface sources: Streams, lakes, Rivers, Ponds, impounded Reservoirs,Stored rainwater,

3.4 Suitability of Surface water with regard to quantity and Quality.

3. 5 Underground water Resources: Infiltration, Aquifers, Infiltration galleries, Infiltration wells, Shallow wells, Deep wells, Tube wells, Artesian wells; Springs: Artesian, Gravity, Surface.

UNIT IV: Uses of Fresh Water **10**

4.1 Domestic Uses, Civic or Public purpose, Industrial purpose, Business or Trade Purpose, Agriculture Purpose, Navigation,

4.2 Hydroelectric Power Generation Purpose, Recreation Purpose,

4.3 Factors affecting Water use Loss and waste

4.4 water issues, challenges, and opportunities for the design professions in the 21st century

Swami Ramanand Teerth Marathwada University Nanded

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

B. Sc. First year (Semester – II)

Semester Pattern effective from June -2016

Environmental Science

CCENV II (Section A)

Environmental Ecology (P-III)

Credits: 02 (Marks: 50) **Periods: 45**

UNIT I: Basics of Ecology **10**

1.1 Introduction of Ecology: Definition, Scope, Relation to Other Disciplines, Subdivisions,

1.2 Modern Branches of Ecology, Applications and Significance to Human Beings.

1.3 Environmental Factors :A biotic- Climatic, Topographic and Edaphic Factors
Biotic- Temperature, Light, Water, Humidity, Microclimate and Fire

UNIT II: Ecosystems **15**

2.1 Aquatic ecosystem: Pond, Lake, River, Marine; Estuarine

2.2 Terrestrial ecosystem: Forest ecosystem: Temperate forest, Deciduous forest, Tropical rain forest, Sub tropical rain forest,

2.3Trophical savanna biome, Grass land biome, Desert biome. Deforestation; Desertification; A forestation and types of forestry, Conservation of forest.

2.4 Energy flow in an ecosystem: Primary production, Secondary production

2.5 Food chain: Grazing food chain, Detritus food chain; Food web

2.6 Ecological pyramids: Pyramid of Number, Biomass and Energy

UNIT II: Ecological Relationship: **10**

2.1 Inter specific and intra-specific relationships- Neutralisms, Mutualism, Commensalisms, Ammensilism, Antagonisms,

2.2 Antagonistic Relationships, Symbiosis, and Proto-corporation, Exploitation, Parasitism, Competition, Predation and symbiotic relationships.

2.3 Ecological adaptations: Adaptations in plants- Hydrophytes, Mesophytes, Xerophytes. Adaptations in Animals- Aquatic and desert

UNIT IV: Community Ecology **10**

4.1 Introduction to Community Ecology: Definition, Origin and development of community, Characteristics – Species Diversity, Growth Form, Dominance, Tropic Structure, Density, Frequency, Abundance.

4.2 Ecological Niche, Eco-tone and Edge Effect..

4.3 Ecological Succession: Definition, Types of Ecological Succession, Process, Pattern and Significance..

Swami Ramanand Teerth Marathwada University Nanded

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

B. Sc. First year (Semester – II)

Semester Pattern effective from June -2016

ENVIRONMENTAL SCIENCE

CCENV II (Section B)

Fresh Water Treatment (P-IV)

Credits: 02 (Marks: 50) **Periods: 45**

UNIT I: Analysis of Water 10

1.1 Meaning of Pure water, Reasons of water analysis.

1.2 Physical water analysis: Colour, Odour, Taste, Temperature, Turbidity;

1.3 Chemical water analysis: Chlorides, Dissolved gases, Hardness, pH, Alkalinity, Acidity, Metals, Nitrogen and its compounds, Total solids, Total suspended solids, Total dissolved solids;

1.4 Biological water analysis: Planktons: Phyto, Zoo, Nektons; Bacteriological water analysis: Coli forms, Qualitative and Quantitative, MPN, Presumptive, Confirmatory, Completed, **E**-coli index,

1.5 Water quality standards, Purity maintenance of water

UNIT III: Water Softening Methods 10

3.1 Purpose, Temporary hardness removal, Permanent hardness removal

3.2 Lime soda process, Zeolite process, Demineralization process;

3.2 Colour, odour and taste removal

3.3 Iron and manganese removal; Fluoridation; Defluoridation, Watersheds

UNITIII: Water Treatment Methods 15

2.1 Need and Necessity of treatment,

2.2 Screening, Sedimentation Tanks: Fill and draw, Continuous type;

2.3 Coagulation: any six methods;

2.4 Filtration: Slow sand filters, Rapid sand filters;

2.5 Disinfection: any six methods; Chlorination: Properties of chlorine, Action of chlorine, Application of chlorine, free chlorine gas, Plain chlorination, Pre-chlorination, Post chlorination,

UNIT IV: Water Conservation 10

4.1 Use and over utilization of surface and ground water

4.2 Floods and droughts

4.3 Conflict over water, Benefits and problems related to water

4.4 Sardar Sarovar Dam – Case Study

4.5 Water Conservation Methods

Swami Ramanand Teerth Marathwada University Nanded

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

B. Sc. First year

Semester Pattern effective from June -2016

ENVIRONMENTAL SCIENCE

Practical Paper: CCENVP-I (P-V)

(Annual practical Based on [CCENV I & II (Section A & B))

(Practical syllabus requires four periods per batch per week. First year practical includes studies on Ecological parameters.)

Credits: 04 (Marks: 100)

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01. Measurement of Atmospheric Humidity by Psychrometer.
02. Measurement of Light intensity by Lux meter.
03. Determination of Total organic matter by Ignition method
04. Determination of Soil pH
05. Determination of water holding capacity of soil.
06. Determination of N. P. K. from soil.
07. Determination of bulk density of soil.
08. Identification and description of Phytoplankton's (Any Five)
09. Identification and description of Zooplankton's (Any Five)
10. Plankton counting by Sedgwick cell
11. Determination of plant population density.
12. Estimation of Dissolved oxygen from water by Winkler's method.
13. Estimation of Alkalinity of provided water sample.
14. Estimation of Acidity from provided water sample.
15. Determination of Residual chlorine from provided water sample.
16. Estimation of total hardness from water sample by E. D. T. A. method.
17. Estimation of Permanent hardness from water sample by E.D.T.A. method.
18. Estimation of chlorides from water sample by Argentometric method.
19. Determination of leaf area index
20. Visit to Forest Reserve, National Park, Sanctuaries, Water reservoirs, and submission of

Books Recommended:

1. **Fundamentals of Ecology :** Eugene P. Odum, Natraj Publishers, Dehradun..
2. **Principles of Ecology :** P. S. Verma, V. K. Agarwal S. Chand and Co. New Delhi .
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. **Principles of Soil Science :** Watt K. E. F. (1973), McGraw Hill Book Company, New Delhi .
9. **Introduction to Environmental Studies :** Turk & Turk.
10. **Ecology and Field Biology :** Robert Leo Smith Harper Collins college publication.
11. **General Ecology :** H. D. Kumar , Vikas Publishing house, New Delhi
12. **Elements of Ecology :** Brijgopal, N. Bharadwaj Vikas Publishing house, New Delhi.
13. **Environmental Ecology :** Bill Freedman Academic Press, New York
14. **Concepts of Ecology :** N. Arumugam Saras Publication, Kottar, Dist. Kanyakumari .
15. **Plant Ecology :** P. L. Kochhar
16. **Water Supply and Sanitary Engineering :** S. C. Rangwala, R. C. Rangwala Charotar Publishing House Anand.
17. **Environmental Science :** Nabel and Wright , Prentice Hall, New Jersey
18. **Environmental Chemistry :** B. K. Sharma Goel Publishing House, Meerut.
19. **Water and Hydrology :** Peter B. black,
20. **Environmental Science :** Enger Smith, Smith, W. M. C. Brown , Company Publishing
21. **Principles of Soil Science :** Watt K. E. F. (1973), McGraw Hill Book Company, New Delhi .
22. **Water Supply :** Alan C. Twort, Don D. Ratnayaka,(IWA Publishing, New Delhi
23. **Water Pollution :** B. K. sharma, Dr. H. Kaur Krishna Prakashan Mandir, Meerut
24. **Water Supply and Pollution Control :** Warren Wiessman, Jr. Mark J. Hammer AWL Publishers, California
25. **Water and Waste Water Technology :** Mark J. Hammer, Mark J. hammer Jr. Prentice Hall of India Pvt,Ltd., New Delhi
26. **A textbook of Environmental Studies :** G. R. Chatwal, Harish Sharma, Himalaya Publishing House, New Delhi
27. **Environment Problems & Solutions :** D. K. Asthana, Meera Asthana, S. Chand & Co., New Delhi,1998
28. **Water Supply and Pollution Control :** Warren Viessman, Jr. Mark J. Hammer, Addision – Wesley California, 1999

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Swami Ramanand Teerth Marathwada University, Nanded
Model Question Paper (Practical) Annual
Class: B.Sc. First Year (CBCS)
Subject: Environmental Science
Paper : Env.105: Laboratory Course

Time: Three Hours **Maximum Marks: 100**

Q. 1: Estimate Dissolved Oxygen / Total Hardness / Permanent Hardness from provided water sample 25

OR

Determine Total organic matter from soil / Water holding capacity of soil /Soil pH by pH meter.

Q. 2: Determine Acidity / Determine Atmospheric moisture from the air by Psychrometer / Residual chlorine from provided water sample/Determine NPK from soil / Bulk density of soil. 25

OR

Identify and comment on Phytoplankton's / Zooplankton's. (Any Three)

Q. 3: Determine leaf area index of provided leaf / Determine plant population density.

OR

Determine Alkalinity from the provided sample. /

Determine Chlorides from provided water sample / Measure the light intensity by Lux meter / Count the Planktons from provided sample by Sedgwick rafter cell. 20

Q. 4: a) Record Book submission 10

b) Excursion Report 10

c) Viva – Voc 10

List of Instruments and Requirements for Practical's

1. **Psychrometer**
2. **Luxmeter**
3. **Bunsen Burners**
4. **Nickel Crucible**
5. **pH meter**
6. **Stirrer**
7. **Soil Testing Kit.**
8. **Microscopes**
9. **Sedgwick Cell**
10. **Chloroscope kit**
11. **Hot Plate**

Swami Ramanand Teerth Marathwada University, Nanded.

Model Question Paper (Theory)
Class: B. Sc. First Year (Semester I & II)
Subject: Environmental Science
W.e.f, June 2016

CCENV I (Section A) : Fundamentals of Environmental Science- Paper-I

CCENV I (Section B) Paper :Fresh Water : Sources and Uses- Paper-II

CCENV II (Section A) Environmental Ecology- Paper-III

CCENV II (Section A) Freshwater Treatment-Paper-Iv

Time: Two Hours **Maximum Marks: 040**

Q. 1: Objectives (Compulsory) 10 marks

Q. 2: Essay Type Question 10 marks

OR

a) Short Question 05 marks

b) Short Question 05 marks

Q. 3: Essay Type Question 10 marks

OR

Essay Type Question 10 marks

Q. 4: Short Notes (Any Two) 10 marks