

DEPARTMENT OF MICROBIOLOGY
PART III – SEC – II
CO-CURRICULAR COURSES
(To be offered from Semester – II – IV)

19UMBCOC01	Environmental Auditing & Monitoring	80 hrs duration- 1 credit
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Course Objectives:

On successful completion of this course a student will be able to:

1. To develop skills and knowledge for translating the theory and concepts of resource and environmental management into practice relevant to communities and workplaces today.
2. To apply monitoring and environmental management tools used by resource and environmental practitioners.
3. To consider the impacts of flows (energy, water, resources/waste) within the built, urban, agricultural and natural environments.

Unit 1: Multidisciplinary nature of environmental studies **12hrs**

- Definition, scope and importance, need for public awareness.
- Ecosystems : Concept, Structure and importance
- Types of Ecosystem
- Food chain and Food web
- Global Food demand and supply

Unit 2 : Natural resources and associated problems **12hrs**

- Introduction to Natural Resources, Types of Natural Resources, Role of an individual in conservation of natural resources.
- Forest resources : Types, importance, Human impact, Forest Wealth in India
- Water resources :
- Energy & Mineral resources :
- Food resources

Unit 3 Environmental Pollution **12hrs**

- Definition, Cause, effects and control measures of :-
 - a. Air pollution
 - b. Water pollution
 - c. Soil pollution
 - d. nuclear hazards
 - e. Noise pollution
 - f. Thermal pollution
- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Disaster management: floods, earthquake, cyclone and landslides.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.
- Role of an individual in prevention of pollution.

Unit 4: Environment AUDIT:**12hrs**

- Definition of Environment Audit
- Importance of Environment auditing for industries.
- Types of audits, General audit methodology and basic structure of audit.
- Elements of an audit process and its importance.
- Concept of ISO14000

Unit 5: Environmental Monitoring**12hrs**

- **Air Quality Parameters:** Relevant instruments/equipments and procedures (High Volume Sampler, Handy Sampler, Noise Meter, Spectrophotometer etc) TSPM, RSPM, SO₂, NO_X, Stack Monitoring, Noise Level Measurements etc.
- **Water Quality Parameters:** Water Quality Guidelines for Human Uses
- Relevant instruments/equipments and procedures (Flame Photometer, Water Testing Kits, Digital pH meter, BOD Incubator, Dissolved Oxygen Meter) Alkalinity, Ammonical Nitrogen, BOD, COD, DO, Coliforms, Fluoride, Nitrate-Nitrogen, pH etc.
- **Soil Quality Parameters:** Introduction to Soils and Sediments, Relevant instruments/equipments and procedures (Soil Testing Parameters), pH, EC, Soil Moisture, Phosphate, Potassium, Sodium, etc.
- Case Study

Text books:

1. Manoj Tiwari, Kapil Khulbe and Archana Tiwari; *Environmental Studies*; I. K. International Publishing House Pvt. Ltd.
2. B. K. Mohapatra; *Fundamentals of Environmental Science and Engineering*; Dhanpat Rai & Co. (P) Ltd.
3. P. D. Sharma; *Ecology and Environment*, Rastogi Publications.

Reference books:

1. P. S. Verma and V. K. Agarwal; *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*; Multicolour Illustrative Edition; S. Chand & Company Ltd.
2. Himanshu Vashist; *Environmental Education: Problems and Solutions*; Book Enclave.

List of Practicals:

20 hrs

1. Water testing (According to BIS permissible limits):

1. Physical parameters:

- a. To estimate the TS, TSS and TDS of given water samples
- b. To check the turbidity of given water sample
- c. To check the water temperature

2. Chemical parameters:

- a. To check the pH content of water
- b. To check the chloride content of given water sample
- c. To check the total hardness of given water sample
- d. To check the calcium content of water
- e. Estimation of sulphate in given water sample
- f. Estimation of nitrogen in given water sample
- g. Estimation of phosphorus in given water sample
- h. Estimation of residual free chlorine in given water sample
- i. Estimation of DO in given water sample
- j. Estimation of BOD in given water sample
- k. Estimation of COD in given water sample

3. Microbial testing:

- a. To check the total plate count in given water sample
- b. MPN test

2. Air testing:

1. Detection of particulate pollutants present in air
2. Detection of gaseous pollutants present in air

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