

SHIVAJI UNIVERSITY, KOLHAPUR



Accredited By NAAC with 'A' Grade

CHOICE BASED CREDIT SYSTEM

Syllabus For

B.Sc. Part –II

Pollution

SEMESTER III AND IV

(Syllabus to be implemented from June, 2019 onwards.)

CHOICE BASED CREDIT SYSTEM (CBCS)

Syllabus For

B.Sc. Part - II

Subject-Pollution

SEMESTER III AND IV

(Syllabus to be implemented from June, 2019 onwards)

SEMESTER –III

Pollution Paper I: DSC IC47: Ecology and Environment

CREDITS: 2, LECTURE PERIODS: 3 PER WEEK- LECTURE HOURS: 2.4 PER WEEK, MARKS: 50

Unit 1. Ecology – Introduction, Definition, Population and Community Ecology (Natality, Mortality), Community Characteristics (Density, Abundance, Frequency), Ecological succession: Types of succession and its significance. **9**

Unit 2. Ecosystem–Introduction, Definition,Structure of Ecosystem, Biotic and Abiotic components, Food chain and Food web, Ecological pyramids, Aquatic and Terrestrial ecosystems.

11

Unit 3. Environment – Introduction, Definition,Environmental components: Atmosphere, Hydrosphere, Lithosphere, Temperature, Water, Soil. **5**

Unit 4. Biodiversity-Introduction, Definition,Basic concept of Biodiversity, Hot spots of biodiversity in India,Economic value of biodiversity, Threatsto biodiversity,Biodiversity Management, Endangered and Endemic species. **6**

Unit 5. Biogeochemical cycle– General concept of Biogeochemical cycles, Global Biogeochemical cycles – Oxygen cycle, Carbon cycle, Nitrogen cycle and Phosphorous cycle. **5**

Pollution Paper II: DSC IC48: Environmental Pollution

CREDITS: 2, LECTURE PERIODS: 3 PER WEEK- LECTURE HOURS: 2.4 PER WEEK, MARKS: 50

- Unit 1. Pollution** – Introduction, Definition, Concept and Origin **4**
- Unit 2. Environment and Impact of human activities** – Introduction, Agriculture, Housing, Transportation, Industries, Water resource projects, Power generation, Mining, Tourism, Socio-economic activities, Defense related activities, Petroleum processing, Commercial deforestation. **7**
- Unit 3. Factors Affecting the Environmental Pollution**-Population explosion, Urbanization, Consumerism, Industrialization. **6**
- Unit 4. Types of Pollution**-Air pollution, Water pollution, Soil pollution, Thermal pollution, Heavy metal pollution, Marine pollution, Noise pollution, Radioactive pollution. **12**
- Unit 5. Historical episodes**- Bhopal Gas, Chernobyl, Torrey Canyon, London Smog, Minamata. **7**

SEMESTER –IV

Pollution Paper III: DSC ID47: Air and Water Pollution

CREDITS: 2, LECTURE PERIODS: 3 PER WEEK- LECTURE HOURS: 2.4 PER WEEK, MARKS: 50

Unit 1. Air Pollution – Introduction, Definition, Causes of air pollution – i) Manmade (Domestic, Industrial, Automobile, Agriculture, Mining); ii) Natural (Pollen grains, Spores, Volcanic eruption, Cyclones, Earthquake, Storms, Fog). **8**

Unit 2. Effects of Air pollutants –

a. Human health, Vegetation, Monuments.

b. Greenhouse effect, Acid rain, Photochemical smog. **8**

Unit3. Prevention and Control of Air Pollution –

a. Methods of controlling gaseous pollutants,

b. Methods of controlling particulate pollutants. **5**

Unit4. Water Pollution – Introduction, Definition, Water quality parameters, States of water in environment, Types and sources of water pollution. **5**

Unit5. Effects and Control of Water Pollution–

a. Effects of water pollution – Phytoplankton, Zooplankton, Toxicity, Bioaccumulation, Biomagnification.

b. Control of water pollution – Biological methods [Upflow Sludge Blanket (USB), Bioreactors], Physico-chemical methods (coagulation, flocculation, filtration, ion-exchange oxidation pond). **10**

Pollution Paper IV: DSC ID48: Soil and Solid Waste Pollution

CREDITS: 2, LECTURE PERIODS: 3 PER WEEK- LECTURE HOURS: 2.4 PER WEEK, MARKS: 50

Unit 1. Soil Pollution – Introduction, Definition, Soil (origin, formation, composition and soil profile), Types of soil pollution. **5**

Unit 2. Causes and Effects of Soil Pollution –

a. Causes of soil pollution (Natural, Man-made).

b. Effects of soil pollution (Soil salinity, soil acidification, soil fertility, soil texture, plant growth, human health). **10**

Unit 3. Control Measures of Soil Pollution – Waste disposal, Incineration of waste, Biofertilizer, Biological pest control. **5**

Unit 4. Solid Waste Pollution – Introduction, Definition, Type of solid wastes.

a. Causes of solid waste (Domestic, Industrial, Agriculture, Biomedical),

b. Effects of solid waste (Soil, Water, Air, Human health). **10**

Unit 5. Solid Waste Management- Disposal methods, Recovery and Recycling, Composting, Landfilling. **6**

Practical Course-I

1. Study of any one ecosystem (1)
2. Determination of minimum size of the quadrat by species area curve method (1)
3. Determination of frequency and relative frequency of grassland species by list quadrat method (1)
4. Determination of density and relative density of grassland species by list quadrat Method (1)
5. Estimation of biomass of grassland community (2)
6. Determination of 'Importance Value Index' of grassland species (1)
7. Determination of frequency of grassland species by line transect method (1)
8. Determination of frequency of grassland species by belt transect method (1)
9. Study of algae from drinking water treatment plant (2)
10. Determination of zooplankton density by Sedgwick-Rafter Cell (1)
11. Determination of frequency distribution (1)
12. Determination of standard deviation and coefficient of variations (1)
13. Calculation of Sequential Comparison Index (SCI) in benthic macroinvertebrates (1)
14. Quantitative determination of sulphur dioxide in air by iodometric titration method (1)
15. Quantitative estimation of aerosoles in air by slide and beaker method (2)
16. Study of sulphation rate candle (1)
17. Fumigation of sulphur dioxide on plants and study of visible injury (2)
18. Study of physical parameter of water (Any two samples) (1)

Practical Course-II

1. Determination of soil pH (Any two samples) (1)
2. Estimation of dissolved oxygen in water (DO) (1)
3. Estimation of BOD in water (2)
4. Estimation of TDS in water (2)
5. Estimation of chloride in water (1)
6. Determination of hardness of water (1)
7. Estimation of inorganic phosphorus in water (1)
8. Study of water conductivity (Any two samples) (1)
9. Study of temperature of water (Any two samples) (1)
10. Determination of total alkalinity in water (1)
11. Determination of light penetration by Secchi disc (1)
12. Determination of composition of solid waste (1)
13. Determination of insoluble fractions from given solid waste (1)
14. Determination of chlorophyll in aquatic plant *Hydrilla* (1)
15. Study of the aquatic weed *Eichhornia crassipes* (1)
16. Field visit(Vermicompost unit/PUC centre/Stone crusher) (3)

Instructions for Practicals and Study Tour:

- A.** A study tour of at least two days duration should be undertaken to visit places like Industries, Research Institutions, Research and Development Departments, Pollution Control Boards, Academic Institutions, Natural and Polluted Areas, Mining Areas, Areas of Environmental Interest, etc.
- B.** Every candidate/student must have recorded his/her observations on the above practicals in the laboratory journal and written report on each exercise performed. Such journal is to be checked regularly and signed by a teacher in charge. The Head of Department has to certify the same stating that the student has completed in a satisfactory manner the practical course as recommended by the Board of Studies, Shivaji University, Kolhapur and the journal has been properly maintained throughout the year.
- C.** Candidates shall be required to submit the following at the time of practical examination.
- a. Certified laboratory Journal
 - b. Tour Report (Should be written in journal)
- D.** The candidates shall be orally examined (Viva-voce) for tour report, and other knowledge they gained of the subject during theory and practicals. Distribution of marks for practical shall be 50 marks for each practical (Total 100 for Practical-I + Practical-II).

REFERENCE BOOKS

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5. Hillary, 2000. Ecology. Multimedia Publication, London.
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7. Ladbetter J.O., 1972. Air Pollution, Marcel Dekker.
8. Liptak, B.G. Environmental Engineers Handbook, Vol. I, Air Pollution, Chilton Book Company, U.S.A.
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11. Nemerow, N.L. Theories and Practice of Industrial Waste Treatment, Addison-Wesley, Reading, U.K.
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23. Erach Bharucha,2009.Text Book of Environmental Studies UGC, Universities Press
24. S. K. Agarwal,2005.Water Pollution A.P.H. Publishing corporation New Delhi
25. Chatwal G. R. and Sharma Harish,2017.A Text Book of Environmental Studies Himalaya Publishing House.
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