

# Government college for girls

## PG Department of Botany

### Syllabus

#### Msc

070 117-4000

#### PAPER XV: ECOLOGY AND ENVIRONMENT

**Objective** of the paper is to impart knowledge about various aspects of Ecology and Environment like Plant Communities and Ecosystems, Population Ecology, Biosphere Reserves, Biogeochemical cycles, Biodiversity and its conservation strategies, Pollution, Natural Resources and Non-conventional sources of energy, Climate change, Global Warming, Ozone depletion, Alien plant's invasion and Weed management.

**Teaching methodology** includes delivery of lectures by the teachers using black board and many other tools like Visual Charts, Over Head projector etc. The students also make group discussions. In practical the students study the soil samples for pH, conductivity, water holding capacity etc. They also study the ecosystems using Quadrat methods.

Theory : 75(60A+ 15HT)  
Practical : 25(20A+5HT)

#### THEORY

Max. Marks : 60

**NOTE :** Question paper will have *four* sections. Examiner will set a total of nine questions comprising two questions from each unit, and one compulsory question of short answer /MCQ type covering the whole syllabus. Students will attempt one question from each unit and the compulsory question. All questions may carry equal marks, unless specified.

#### UNIT-I

1. **Environment & Ecosystem:** Concept and Principles.
2. **Population Ecology:** Characteristics of a population, Population growth curve, Population regulation, Life history strategies, Concept of metapopulation – Demes and dispersal, Intrinsic extinctions, Age structured populations.
3. **Plant Communities:** Definition, quantitative characters of Plant Communities. Different sampling techniques to study quantitative characters of plant communities.

#### UNIT-II

4. **Biosphere Reserve :** The concept, Major functions, Nilgiri Biosphere Reserve ( a brief account )
5. **Bio-Geochemical Cycles:** General account types, brief account of the following bio-geochemical cycles: Carbon cycle, Nitrogen cycle, Phosphorus cycle and Sulphur cycle. .
6. **Biodiversity:** Concept, level, measuring of biodiversity; significance in terms of economic, spiritual, scientific, educational, ecological and genetical values; reasons for depletion, magnitude, distribution and conservation strategies; diversity loss from monoculture plantations. Concepts of phytogeography: Endemism, Hotspots and hottest hotspots; Plant Explorations; Invasions and Introductions.

#### UNIT-III

7. **Pollution:** Definition, different types of pollutants. **Air pollution:** different pollutants of air, control of Air pollution; **Water pollution :** different sources of water pollution, control of water pollution; **Land pollution :** sources, control of land pollution ; Bioremediation and Phytoremediation.

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8. **Management and Conservation of Natural Resources :** Aims and objectives of conservation; renewable and non-renewable resources; special interest and total ecosystem conservation policy; maintenance of ecological processes; management of agriculture, forest and soil; preservation of plant genetic diversity; conservation strategies required at national and international level, sustainable development.
9. **Non Conventional Sources of Energy:** Solar Energy, Hydro Power, Wind Power, Biogas, Geothermal Energy, Ocean Thermal Energy, Tidal Energy, Wind Energy.

#### UNIT-IV

10. **Ozone Depletion:** Reasons and its effects on plants, methods to check ozone depletion.
11. **Invasion of Alien Plants;** Concept, ecological impact and management
12. **Global Warming and Climate Change:** Reasons, effects and the techniques used to control global warming.
13. **Weed Management:** The impact, use and ecological role of weeds in agro-ecosystems, weed characteristics related to success; Major weeds of the world; Ecological approach to weed management, Problems of the weeds; Allelopathy, its mode and Exploitation in weed management.

**UNIT-III**

Elementary knowledge of the following plants (Botanical names, families, parts used and economic importance) :

- i) Wheat, Maize, Rice, Moong, Gram (Food).
- ii) Teak, Shisham, Deodar, Sal (Timbers).
- iii) Cotton, Jute, Coir, Flax (Fibres).
- iv) Fennel, Coriander, Turmeric, Ginger, Mint, Clove (Spices and Condiments).

**UNIT-IV**

Elementary knowledge of the following plants (Botanical names, families, parts used and economic importance) :

- i) Bamboo, Eucalyptus (Pulp plants).
- ii) Liquorice, Belladonna, Aconite, Ashwagandha, Arjun, Poppy, Amla (Medicinal plants).
- iii) Tea and Coffee (Beverages).

**Forestry:** Forest conservation, wood seasoning and its preservation.

**Suggested Readings**

1. Kochhar, S.L. Economic Botany in Tropics, (4<sup>th</sup> edition). Macmillan India Ltd., New Delhi, 2012.
2. Saini, A. Ecology and Economic Botany, Trueman Book Co., Jalandhar, 2015.
3. Sharma, O.P. Hill's Economic Botany (Late Dr. A.F. Hill, Adapted by O.P. Sharma). Tata McGraw Hill Co. Ltd., New Delhi, 1996.
4. Simpson B. and Ogorzaly, M. Economic Botany: Plants in our World (3<sup>rd</sup> edition). McGraw Hill Publisher, 2000.
5. Taiz, L. and Zeiger, E. Plant Physiology (5<sup>th</sup> edition), Sinauer Associates, Inc., Publishers, Massachusetts, USA, 2010
6. Singh, V., Pande, P.C. and Jain, D.K. Economic Botany, Rastogi Publications, Meerut, 2012.

**UNIT-III**

Community Ecology: Community characteristics, frequency, density cover, life forms, biological spectrum; ecological succession – Hydrosere and Xerosere.

**UNIT-IV**

- Applied Ecology :**
- a) Air, water and soil pollution and their control.
  - b) Conservation and management of natural resources.  
(renewable and non-renewable)

**Suggested Readings**

1. Kormondy, E.J. Concepts of Ecology. Prentice-Hall of India Pvt. Ltd., New Delhi, 1996.
2. Odum, E. and Barrett, G.W. Fundamentals of Ecology, Cengage Learning Publisher, 2004.
3. Odum, E.P. Basic Ecology, Saunders, Philadelphia, 1983.
4. Saini A. Ecology and Economic Botany, Trueman Book Co., Jalandhar, 2015.
5. Sharma, P.D. Ecology and Environment, Rastogi Publications, Meerut, 2012.

**Suggested laboratory exercises:****Plant Physiology:**

1. To determine osmotic pressure of cell sap by plasmolytic method.
2. To demonstrate imbibition pressure using:
  - i) Imbibition pressure apparatus.
  - ii) Plaster of Paris cone.
3. To demonstrate osmosis through animal membrane/potato osmoscope.
4. To demonstrate plasmolysis and deplasmolysis.
5. To demonstrate mechanical and electrical adsorption.
6. To demonstrate the measurement of transpiration using simple potometer.
7. To demonstrate transpiration pull.
8. To study the effect of light intensity, and wind velocity on the rate of transpiration using Ganong's potometer.

Van mahotsav (july 7,2022): Aim of celebrating van mahotsav was to promote afforestation and conservation of forests. On this day students planted trees in the college campus. These trees help to conserve the flora and fauna of the college. It also prevents the. Soil erosion and also gives us clean and



fresh air. It also helps in reducing the pollution.

Ozone day (september 16,2022) was organised in the college highlighting the importance of ozone and need of protecting the ozone layer ppt competition, poster making competition and a rally was also organised to make students aware about the same and to reduce the use of chemicals.

\*Cleanliness drive\*-- \*(OCTOBER17,2022) On the occasion of Diwali cleanliness, drive was conducted in the college campus making tutees aware of clean Diwali in order to protect the environment from pollution.





Essay writing competition was held on " Environmental issues" in which students participated very enthusiastically sharing their views on environmental sustainability.

Workshop on vermicompost(march13,2023):- A workshop on vermicomposting was organized in college campus in which Dr. SS Hundal gave information about techniques of vermicompost. In our college, Bio-waste from college canteen and litter of trees were utilised in vermicomposting unit to prevent soil pollution.

On the occasion of environment day celebrated on 5th June, The Environment and Swachh Society of Government College for Girls Ludhiana undertook various set of activities to create awareness among the students. Plantation drive was carried throughout the campus by students. Students were encouraged to make plastic free environment by using cloth bags over plastic bags. Cleanliness drive was held around the campus to create pollution free environment. Vermicomposting techniques were explained to students to promote sustainable environment and also added nature friendly skills in their lifestyle.

