## SARDAR PATEL UNIVERSITY

## $\label{eq:msc} \textbf{Programme: MSC (Integrated Biotechnology)}$

**Semester: IV** 

**Syllabus with effect from: December 2011** 

Paper Code: PS04CIGB03	Total Creditar 2
Title Of Paper: Environmental Biology	Total Credits: 3

Unit	Description in detail	Weightage (%)
1	<b>Ecology:</b> Introduction, Sub-divisions, Levels of organization, Scope of ecology	
	<ul> <li>Approaches and factors</li> </ul>	
	<b>Ecosystem:</b> Abiotic components of ecosystem – Habitat, Gases, Inorganic and	
	organic nutrients, Energy, Microclimates, Biotic components of ecosystem -	
	Autotrophs, Heterotrophs – Producers, Consumers, Decomposers, Food-chains	
	and Trophic levels, Ecological pyramids – Pyramid of numbers, Pyramid of	
	biomass, Pyramid of energy, Productivity of ecosystem	
2	Biotic Relationships: Inter-specific relations – Neutral relationships:	
	Neutralism, Commensalism, Positive relationships: Mutualism (between plants,	
	between plant and animal, between animals), Negative relationships:	
	Amensalism, Predation, Competition, Parasitism	
	Autecology: Biological clock – Light as universal synchronizer, Diurnal	
	rhythms in plants and animals, Lunar rhythms, Annual rhythms, Mechanism of	
	biological clock <b>Population Ecology:</b> Natality, Mortality, Survivorship curves, Life table, Age	
	structure	
	Community Ecology: Community structure - Qualitative features, Community	
	function – Dynamics and succession, Climax concept	
3	Water: Amount and distribution, Forms, Physical properties, Water and	
	temperature, Effects of water on animals – Hydrocoles, Mesocoles, Xerocoles	
	<b>Soil:</b> Soil formation, Soil profile, Composition of soil, Classification of soil,	
	Weathering of soil	
	Aquatic ecosystems: Freshwater ecosystem, Lakes, Lotic waters, Pond as an	
	ecosystem Ocean ecosystem, Estuarine ecosystem	
	Terrestrial ecosystems: Arctic ecosystem, Tundra ecosystem, Taiga or	
	Coniferous ecosystem, Temperate deciduous forests ecosystem, Tropical	
	rainforest ecosystem, Temperate grassland ecosystem, Desert ecosystem	
4	<b>Temperature:</b> Range, tolerance, Effect of temperature on animals and plants	
	Light: Light on land – Intensity, Duration and Amount, Effect of light on	
	animals and plants	
	Ecological Adaptations: Origin of adaptive and non-adaptive characters –	
	Convergent adaptations, Divergent adaptations, Adaptive radiation, Types of	
	adaptations – Cursorial, Fossorial, Desert, Aquatic, Scansorial, Volant,	
	Parasitic and Physiological adaptations	
	<b>Biogeochemical cycles:</b> Hydrological cycle, Gaseous nutrient cycles –	
	Nitrogen cycle, Carbon cycle, Sedimentary nutrient cycles – Phosphorous	
	cycle, Sulphur cycle.  Practical:	
	Limnological Analysis:	
	Determination of water pH and Total hardness	
	Estimation of Free carbon dioxide	
	Estimation of Free carbon dioxide     Estimation of Carbonate, Bicarbonate and Total alkalinity	
	Estimation of Cardonate, Dicardonate and Total arkaning	



- Estimation of Dissolved Oxygen (DO) and Biological Oxygen Demand (BOD)
- Estimation of Sulphate, Phopsphate and Nitrate

## **Analysis of Soil:**

- Rapid field tests pH, Carbonate, Nitrate, Chloride and Total soluble salts
- Determination of soil moisture content
- Estimation of Carbonate and Bicarbonate
- Estimation of Chloride
- Estimation of Calcium carbonate
- Determination of Organic matter and Organic carbon
- Determination of available Phosphorus, Sulphur and Nitrogen

## **Basic Text & Reference Books:**

- ➤ A Textbook of Environmental Studies by DK Asthana & M Asthana, S. Chand Publications, New Delhi (ISBN: 81-219-2769-1)
- ➤ Ecology Principles and Applications by JL Chapman and MJ Reiss. 1998. Cambridge University Press. (ISBN: 0521588022)
- ➤ Ecology and Environment by PD Sharma, 10<sup>th</sup> Revised Ed., Rastogi Publications, Meerut (ISBN: 81-7133-905-0)
- Ecology by MP Arora, 2004 Ed. Himalaya Publishing House, New Delhi. (ISBN 81-7866-784-3)
- ➤ Elements of Ecology by Robert Smith and Leo Smith.2002. John Wiley Press, London. (ISBN: 0-8053-4473-X)
- ➤ Environment Problems and Solutions by DK Asthana & Meera Asthana, S. Chand Publications, New Delhi (ISBN: 81-219-1654-2)
- ➤ Environmental Biology by PS Verma and VK Agarwal. 2005. S. Chand Publications, New Delhi. (ISBN 81-219-0859-0)
- ➤ Environmental Science Practical and Field Manual by Jitendra Pandey & Madhu Sudan Sharma, Yash Publishing House, Bikaner (ISBN: 81-86882-09-X)
- Environmental Science by SC Santra. 2005. New Central Book Agency (P) Ltd., Kolkata. (ISBN 81-7381-404-X)
- Foundations of Ecology by MC Dash. 2<sup>nd</sup> Revised Ed. 2007. Tata McGraw-Hill Publishing Co. Ltd., New Delhi. (ISBN 0-07-042147-1).
- Fundamentals of Ecology by EP Odum. 1996. W.B. Saunders Co., Philadelphia. (ISBN: 9468881623)

