KONGUNADU ARTS AND SCIENCE COLLEGE

(Autonomous)

Coimbatore – 641 029

Department of Botany

PG Diploma in Biodiversity

Principles, Management and Conservation

PG Diploma in Biodiversity – Principles, Management and Conservation

Semester	Subject Code	Title of the Paper	Instruction hours /cycle	Exam Marks			Duration of Exam (hours)	Credits
				CIA	ESE	Total		
I	**18PDB101**	**1.Introduction to Biodiversity**	2	-	100	**100**	3	**2**
	18PDB102	**2 . Values, uses and loss of Biodiversity**	2	-	100	**100**	3	**2**
	18PDB103	**3. Conservation and management of Biodiversity**	2	-	100	**100**	3	**2**
	18PDB1CL	**Pratical**	2	-	100	**100**	3	**2**
		Total	**8**			**400**		**8**
II	**18PDB204**	**4. Biodiversity prospecting and indigenous knowledge system (IKS) and Biotechnology for Biodiversity**	2	-	100	**100**	3	**2**
	18PDB205	**5. Wildlife biology and conservation policies and law**	2	-	100	**100**	3	**2**
	18PDB2Z1	**Project & Viva- voce**	4		200	**200**	-	**4**
		Total	**8**			**400**		**8**
		Grand total	**16**			**800**		**16**

Programme Code: 05		Title: PG Diploma in Biodiversity – Principles, Management and Conservation		
Course Code:18PDB101		Paper: 1 - INTRODUCTION TO BIODIVERSITY		
Batch 2018-2019	Semester I	Hours / Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

- To know the principles and concepts of biodiversity.
- To understand the services of species diversity.
- To acquire knowledge on the role of biodiversity in maintaining ecobalance.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the services of biodiversity.
K2	CO2	Understand the types of species diversity.
K3	CO3	Analyze the concepts of biodiversity.
K3	CO4	Evaluate the economic value of biodiversity

SYLLABUS

UNIT – I **(6 Hours)**

Introduction: Concept and definition. Types of biodiversity – genetic, species ecosystem and landscape diversities. α, β and γ diversity. Pattern diversity.

UNIT - II **(6 Hours)**

Species diversity status: Species inventory – problems and monitoring. Current diversity status of flora, fauna and microbes at global and national levels. Centres of diversity – hotspots, megadiversity centres, future of species diversity studies.

UNIT - III **(6 Hours)**

Species diversity history and indices: History and origin of species diversity*. Diversity indices based on species – species richness, abundance and taxic diversity. Comparisons of species diversity of various sites – species/area relationships, spatial patterns of species diversity. Global distribution of species richness – latitudinal, altitudinal and rainfall gradients and other factors.

UNIT - IV **(6 Hours)**

Agrobiodivesity: Introduction. Origin and evolution of cultivated species diversity – act of domestication, geography of domestication, dispersal and diversification. Diversity in domesticated species – land races, advanced cultivars, wild relatives of cultivated plants, wild plants, and feral plants.

UNIT - V **(6 Hours)**

Ecosystem types and services: Classification, measuring ecosystem diversity, major ecosystems of world – forests, grasslands, deserts, fresh water, wetlands and marine. Functional role of species diversity in ecosystems.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity oxford of IBH publishing Co. Pvt. Ltd. New Delhi.
2. Harris, D.R. and Hillman, G.C. 1989. Introduction. *In*: Harris, D.R. and Hillman, G.C. (Eds.). Foraging and Farming: the Evolution of Plant Exploitation. Unwin Hyman, London, pp. 1-8.
3. Sharma, P.D. Ecology and Environment, Eastogi Publications, Murur.

REFERENCES

1. Thomas, R. 1992. Genetic Diversity. *In:* Goombridge, E. (Ed.). Global Biodiversity. Status of the Earth's Living Sources. Chapman & Hall, London, pp. 1-6.
2. Magurran, A.E. 1988. Ecological Diversity and its Measurement. Princeton Univ. Press, Princeton, NJ.
3. Pielou, E.C. 1975. Ecological Diversity. John Wiley and Sons. New York. NY.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	M
CO2	S	M	H	M	H
CO3	H	S	H	S	S
CO4	H	H	M	S	M

S - Strong **H** - High **M** - Medium **L** - Low

Programme Code: 05		Title: PG Diploma in Biodiversity – Principles, Management and Conservation		
Course Code: 18PDB102		Paper: 2 - VALUES, USES AND LOSS OF BIODIVERSITY		
Batch 2018-2019	Semester I	Hours / Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

- To know the value of biodiversity.
- To understand the valuation methods of species content.
- To gain knowledge on the factors of species loss.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the values of bioresources.
K2	CO2	Know the possible ways to reduce the ecosystem loss.
K3	CO3	Understand the role of several factors on biodiversity loss.
K3	CO4	Evaluate the values of species by various methods

SYLLABUS

UNIT - I **(6 Hours)**

Introduction. Biodiversity values – Total environmental value, primary value, total economic value, use value, consumptive use value, productive use value, indirect use value, non-consumptive use value, non-use value, option value, quasi-option value, existence value and bequest value. Ethical and aesthetic value*. Precautionary principle.

UNIT - II **(6 Hours)**

Valuation of biodiversity: Methods – outline on basics of MaCArthur, 1997, Changes in productivity method, contingent valuation method, hedonic pricing method, travel cost method.

UNIT - III **(6 Hours)**

Loss of genetic diversity: Factors causing loss of genetic diversity – Founder effects, demographic bottlenecks, genetic drift, inbreeding depression.

UNIT - IV **(6 Hours)**

Loss of species diversity: Processes responsible for species extinction – Deterministic processes, stochastic processes – demographic uncertainty, environmental uncertainty, natural catastrophis, and genetic uncertainty. Population size as a critical factor in species extinction – minimum viable population and population viability analysis. Threatened species – definition. IUCN threatened categories and unknown categories.

UNIT - V **(6 Hours)**

Loss of ecosystem diversity: Factors affecting ecosystem degradation and loss. Loss in diversity of major ecosystems – tropical forests, grasslands, inland wetlands, coastal ecosystems, arctic and alpine ecosystems, temperate forests systems, arid and semiarid lands, open oceans. Projected scenario for biodiversity loss.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Myers, N. 2000. The new millennium: An ecology and economy of hope. Curr. Sci. 78: 686-693.
3. MacArthur, J. 1997. The economic valuation of biodiversity, its implications and importance in bioresource planning, and initiations for its regular use in planning conservation projects in India. *In:* Pushpangandan, P., Ravi, K. and Santhosh, V. (Eds.). Conservation and Economic Evaluation of Biodiversity. Vol. 2. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 335-354.
4. Balmford, A., Mace, G.M. and Ginsberg, J.R. 1998. The challenges to conservation in a changing world putting process on the map. *In:* Mace, G.M., Balmford, A. and Ginsberg, J.R. (Eds.). Conservation in a Changing World. Cambridge University Press, Cambridge, pp. 1-28.

REFERENCES

1. Hughes, J.B., Daily, G.C. and Ehrlich, P.R. 1997. Population diversity: its extinction. Science 278: 689-691.
2. Lande, R. and Barrowclough, G.F. 1987. Effective population size, genetic variation, and their uses in population management. *In:* Soule, M.J. (Ed.). Viable Populations for Conservation. Cambridge University Press, Cambridge, pp. 87-124.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	H
CO2	H	S	H	H	M
CO3	H	S	M	H	S
CO4	S	M	H	S	H

S - Strong **H** - High **M** - Medium **L** - Low

Programme Code: 05		Title: PG Diploma in Biodiversity – Principles, Management and Conservation		
Course Code: 18PDB103		Paper: 3 - CONSERVATION AND MANAGEMENT OF BIODIVERSITY		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2018-2019	**I**	**2**	**30**	**2**

COURSE OBJECTIVES

- To know the methods of conservation of species.
- To gain knowledge in the area of ecosystem conservation.
- To know the various laws of biodiversity conservation.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the species conservation methods.
K2	CO2	Understand the *in situ* and *ex situ* conservation strategies.
K3	CO3	Understand the laws prevailing in biodiversity conservation both at national and international levels.
K3	CO4	Analyze the ecosystem conservation by noval strategies.

SYLLABUS

UNIT - I **(6 Hours)**

Practice of Conservation: Current practice in conservation. Conservation of genetic diversity. Conservation of species diversity – categories of species for conservation – threatened species, directly harvested plants, indicator species, umbrella species, keystone species, charishmatic species and recreational species.

UNIT - II **(6 Hours)**

Conservation of ecosystem diversity: Relevance of ecosystem diversity as well as services in conservation. Topdown and bottmup protocol for conservation.

UNIT - III **(6 Hours)**

***In situ* conservation:** Protected areas – biosphere reserves and national parks. World biosphere reserve programmes. Design of biosphere reserves – issues determines the success of a reserve - reserve size, spatial and temporal heterogeneity and dynamics, ideal geographic context, connection of different reserves, natural landscape elements, creation of zones within in a limit. Homegardens.

UNIT - IV **(6 Hours)**

***Ex situ* conservation:** Germplasm collections, botanic gardens, seed banks, test tube gene banks, pollen banks, field gene banks, DNA banks. *In vitro* conservation methods. Ecosystem restoration. Social approaches to conservation – sacred grooves*, sthalavrikshas.

UNIT - V **(6 Hours)**

Legislations: Role of educational institutions in biodiversity conservation. IUCN, UNEP, UNESCO, WWF, ICSU, FAO, CAB International, WCMC, ISBI. Biodiversity legislation and conservations – International biodiversity laws. Conservation on biological diversity. Trade related intellectual property rights.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Ambasht, R.S. 1988. Text book of Plant Ecology. Lanka Publishers, Varanasi.
3. Sharma, P.D. Ecology and Environment. Rastogi Publications, Meerut.
4. Given, D.R. 1984. Monitoring and science – the next stage in threatened plant conservation in New Zealand. *In:* Given, D.R. (Ed.). Conservation of Plant Species and Habitats. Nature Conservation Council, Wellington, New Zealand, pp. 83-102.

REFERENCES

1. Lande, R. 1988. Genetics and demography in biological conservation. Science 241: 1455-1460.
2. McNeely, J.A., Miller, K.R., Reid, W.V., Mittermeier, R.A. and Werner, T.B. 1990. Conserving the World's Biological Diversity, IUCN, Gland, Switzerland.

3. Ganeshaiah, K.N., Uma Shaanker, K. and Bawa, K.S. 2001. Conservation of forest genetic resources of a region: combining species-centered and ecosystem based approaches. *In:* Uma Shankar, R., Ganeshaiah, K.N. and Bawa, K.S. (Eds.). Forest Genetic Resources: Status, Threats and Conservation Strategies. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 273-281.

4. Ayenus, E. and 24 others. 1999. International ecosystem assessment. Science 286: 685-686.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	H	S	H
CO2	H	S	H	H	M
CO3	H	M	S	H	S

S - Strong **H** - High **M** - Medium **L** – Low

Programme Code: 05		Title: PG Diploma in Biodiversity – Principles, Management and Conservation		
Course Code: 18PDB1CL		Practical		
Batch 2018-2019	Semester I	Hours / Week 2	Total Hours 30	Credits 2

COURSE OBJECTIVES

- To learn the techniques for plant community analysis.
- To know the complexity and diversity of plant communication.
- To have the knowledge on endangered animals in protected areas.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Understand the programmes being carried out to conserve species in protected areas.
K4	CO2	Investigate the biodiversity status of plant communities.
K5	CO3	Analyze the plant community quantitatively.

LIST OF PRACTICALS

1. To know the ecological status of plants in the communities, the field experiments to be done in the natural vegetation are: a) IVI, b) dominance index c) diversity index d) similarity index.
2. To know the animal status with particular reference to tiger and Nilgiri thar - techniques involved census will be studied.
3. To know the richness of birds, aquatic ecosystems are studied using bird census techniques.
4. Field visits to protected areas for biodiversity conservation.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	S	M	S
CO2	S	M	H	S	H
CO3	H	H	M	H	H

S - Strong **H** - High **M** - Medium **L** - Low

Programme Code: 05		Title: PG Diploma in Biodiversity – Principles, Management and Conservation		
Course Code: 18PDB204		Paper: 4 - BIODIVERSITY PROSPECTING AND INDIGENOUS KNOWLEDGE SYSTEM (IKS) AND BIOTECHNOLOGY FOR BIODIVERSITY		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2018-2019	**II**	**2**	**30**	**2**

COURSE OBJECTIVES

- To know the ethnic communities of India and their role in bioresource management.
- To understand the bioprospecting of natural bioresources.
- To gain knowledge on the role of biotechnology in processing biogoods.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the practices of ethnic groups in conserving wild species.
K2	CO2	Know the database of biodiversity.
K3	CO3	Understand the bioprospecting principles.
K3	CO4	Apply the biotechnological tools for bioprocessing.

SYLLABUS

UNIT - I **(6 Hours)**

Ethnic Community and Biodiversity: Indigenous and ethnic communities of world. Environmental conservation and sustainable uses of natural resources by ethnic societies. Important plant genetic resources conserved by ethnic people in India.

UNIT - II **(6 Hours)**

Bioprospecting: Introduction, IKS, biopiracy. IPRs and ownership of traditional knowledge - issues, Traditional Resource Rights (TRR), Local efforts to date.

UNIT - III **(6 Hours)**

Traditional Societies and Protected areas: Territorial demarcation of traditional societies - introduction. Community forest management. Indigenous people and Protected areas.

UNIT - IV **(6 Hours)**

Biodiversity database: Community biodiversity register. Database and networks on IKS. Community controlled Research. Center for farmers rights. Participatory approach in biodiversity management. Roll of Women, NGOs*.

UNIT - V **(6 Hours)**

Biotechnology and Biodiversity: Monitoring DNA - diversity, PCR based techniques. Use of molecular (DNA) markers to detect plant diversity. Animal biotechnology - recent trends - reproductive technology - artificial insemination, embryo transfer, *in vitro* fertilization. Cloning - DNA cloning, embryo cloning, adult DNA cloning, therapeutic cloning.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2004. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Jain, S.K. 1987. A manual of ethnobotany. Scientific Publishers, Jodhpur.
3. Rajiv, K. Sinha and Shweta Sinha. Ethnobotany. Surabhi Publications, Jaipur.
4. Duff, F. 1997. Overview of the UNEP/GEF Biodiversity Data Management Project (BDM). *In:* Hawksworth, D.L., Kirk, P.M. and Dextre Clarke, S. (Eds.). Biodiversity Information: Needs and Options. CAB International, Wallingford, UK, pp. 115-123.

REFERENCES

1. Amaral, W. 2001. Characterization, evaluation and conservation of forest genetic resources: The potential and limitation of new biotechnology tools. *In:* Uma Shankar, R., Ganeshaiah, K.N. and Bawa, K.S. (Eds.). Forest Genetic Resources: Status, Threats and Conservation Strategies. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 115-125.
2. Lakshikumaran, M., Srivastava, P.S. and Singh, A. 2001. Applications of molecular marker technologies for genetic analysis and assessment of genetic diversity in forest tree species. *In:* Uma Shankar, R., Ganeshaiah, K.N. and Bawa, K.S. (Eds.). Forest

Genetic Resources: Status, Threats and Conservation Strategies. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi, pp. 153-181.

3. McCarty, P.L. 1983. *In situ* bioremediation of chlorinated solvents. Curr. Opinions Biotech. 4: 323-330.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	H	M	S	H
CO2	S	H	S	M	S
CO3	H	S	S	H	H
CO4	S	H	M	S	H

S - Strong **H** - High **M** - Medium **L** - Low

Programme Code: 05		Title: PG Diploma in Biodiversity – Principles, Management and Conservation		
Course Code: 18PDB205		Paper: 5 - WILDLIFE BIOLOGY AND CONSERVATION POLICIES AND LAW		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2018-2019	**II**	**2**	**30**	**2**

COURSE OBJECTIVES

- To understand the values and ethics in wild life conservation.
- To know the diversity and importance of avian fauna.
- To gain knowledge on issues in wildlife conservation.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K1	CO1	Know the diversity in avian fauna.
K2	CO2	Know the places of application of Indian Forest Law for forest protection.
K3	CO3	Understand the values and ethics of wildlife conservation.
K3	CO4	Analyze the current issues in wild life conservation.

SYLLABUS

Unit - I **(6 Hours)**

Values and Ethics in Wildlife Conservation: Definitions and (Instrumental; Intrinsic; Ecocentrism; Religious traditions and conservation) Ethics in conservation. Field Techniques: For invertebrates (planktons; insects/arachnids) and vertebrates (amphibian, reptile, aves and mammals), Line/belt transects, Quadrat sampling, Point count, Scan sampling, Focal sampling, Time constraints sampling, Population indices, Introduction of Wildlife telemetry, Remotely triggered Camera Trapping Avian acoustics and identification based on calls.

Unit - II **(6 Hours)**

Avian ecology: Avian community ecology and habitat selection. Sexual selection in birds. Bird migration. Bird census techniques, Migratory flyways, threats to migrant populations. Sampling designs for population estimation: Population estimation methods, Distance based Sampling Methods, Mark-Recapture for Closed Population, Indices, and Estimation of Demographic parameters.

Unit - III **(6 Hours)**

Current issues in wildlife conservation with case studies: Community based conservation approach, Impact of climate change on species diversity, Compensate payment for environmental services, Human-wildlife conflict, Poaching, illegal trading, Conflict management.

Unit - IV **(6 Hours)**

Protection of Forest and Wildlife Forest Law in India: - Forestry in British and Post British India, Forest as a source of Revenue, Forest Protection and Sustainable use of Forests: Judicial Perspective ,The Indian forest Act, 1927, The Forest (Conservation) Act, 1980, The Forest (Conservation) Rules, 1981,2003, The Environment (Protection) Act, 1986, Ozone Depleting Substances (Regulation)Rules, 2000 Wildlife laws in India - The Wildlife (Protection) Act, 1972; The Wildlife (Protection) Rules, 1995; The Wildlife (Protection) Amendment Act, 2002 , Preservation and Management of wildlife in India: Court Decisions; Ecotourism and Forest Protection*.

Unit - V **(6 Hours)**

Laws Concerning Forest: Wildlife and People The Circular Concerning Joint Forest Management, 1990; Panchayats (Extension to Scheduled Areas) PESA Act, 1996; Forest Right Act, 2006; Recognition of ZOO Rules, 1992; International Laws and Policies Concerning Biodiversity; Gaps in Present Laws and Polices with respect to Biodiversity Conservation.

*** Self study**

Teaching Methods

Power Point presentation/Seminar/Discussion/Assignment

TEXT BOOKS

1. Krishnamurthy, K.V. 2003. An advanced textbook on biodiversity: Principles and practices. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
2. Sharma, P.D. 1994. Ecology and Environment. Rastogi Publications, Meerut.
3. Ambasht, R.S. 1988. Text book of Plant Ecology. Lanka Publishers, Varanasi.

REFERENCES

1. Rosenecraz, A. 1995. Environmental law and policy in India: Cases, materials and statutes. *In*: Armin Rosenecraz, Shyam Divan, Martha L Noble. (Reprt Eds). N M Tripathi Pvt. Ltd, Bombay, India, pp 555.
2. Leela Krishnan, P. 1999. Environmental law in India. Butterworths, New Delhi, India, p. 194.
3. Cirelli, M.T. 2002. Legal Trends in Wildlife Management, FAO Legislative Study No. 74.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	S	M
CO2	H	H	M	H	H
CO3	S	H	S	M	S
CO4	S	M	M	S	H

S - Strong **H** - High **M** - Medium **L** - Low

Programme Code: 05		Title: PG Diploma in Biodiversity – Principles, Management and Conservation		
Course Code: 18PDB2Z1		Project Work and Vivo - Voce		
Batch 2018-2019	Semester II	Hours / Week 4	Total Hours 60	Credits 4

COURSE OBJECTIVES

- To gain knowledge on species diversity at microbe, plant and animal level in natural vegetations.
- To learn the techniques used to sample the vegetation.
- To understand the modern methods in conservation of species.

COURSE OUTCOMES

On successful completion of the course, the students will be able to

K3	CO1	Develop local-specific management strategies for the sustainable utilization and conservation of bioresources.
K4	CO2	Analyze the population structure of flora in natural vegetation.
K5	CO3	Evaluate the population size of various wild animals in forests.

PROJECT WORK

1. Project works related to survey and population studies of microbes, plants and animals.
2. Projects related to management of bioresearches and conservation of flora and fauna.

MAPPING

PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	S	M
CO2	H	S	M	H	M
CO3	S	H	S	S	S
CO4	S	M	M	S	H

S - Strong **H** - High **M** - Medium **L** - Low