BHARATHIAR UNIVERSITY: COIMBATORE – 641 046
DEPARTMENT OF EDUCATION
POST GRADUATE DIPLOMA IN ENVIRONMENTAL EDUCATION
(For the students admitted from the academic year 2017-18 onwards)

1. ELIGIBILITY

The candidates who have UG degree on any discipline from any recognized universities are eligible for admission to PGDEE course.

2. DURATION OF THE COURSE

The course shall extend over a period of one year.

3. SCHEME OF EXAMINATIONS:

Paper Code	Name of the paper	University Examinations			
		Duration in Hours	Max. Marks		
			Internal	External	Total
16PGDEE01	Basic concept in Ecology	3	25	75	100
16PGDEE02	Environmental pollution and source of energy	3	25	75	100
16PGDEE03	Issues and impact in Environmental Education	3	25	75	100
16PGDEE04	Natural Resources	3	25	75	100
Total			100	300	400

4. MEDIUM OF INSTRUCTION AND EXAMINATIONS

The Medium of instruction and examination for all the papers shall be in English.

5. PASSING REQUIREMENTS

(i) A candidate shall be declared to have passed the examination in a subject if he/she secured not less than 50% in the University examinations.

(ii) A candidate who successfully completes the course and passes the examinations prescribed in all the subjects of study shall be declared to have been qualified for the PGDEE.

(iii) If a candidate does not complete the course successfully within a period of two years from the date of his/her joining he/she will not be eligible to receive the PGDEE.

6. CLASSIFICATION OF SUCCESSFUL CANDIDATES

(i) All the candidates securing not less than 60% of the aggregate marks and they have passed the examination in every subject within one year of joining the course shall be declared to have passed in FIRST CLASS.

(ii) Other successful candidates shall be declared to have passed the examinations in SECOND CLASS.

7. SYLLABUS

The syllabus for various subjects shall be clearly demarcated into four units in each paper.

8. QUESTION PAPER PATTERN

Internal Assessment

1. Two tests – each for 15 marks (aggregate)	-	15	Marks
2. Group discussion / Seminar	-	5	Marks
3. Assignment	-	5	Marks
Total	-	25	Marks

Question Paper Pattern

The pattern of Question Paper will be as follows:

Each written paper shall be for the duration of three hours. The question paper will be set according to the following pattern: -

Section – A:	Objective type questions.	10 x 1 = 10 Marks
Section – B:	Short answer questions	3 x 5 = 15 Marks
Section – C:	Essay type questions	5 x 10 = 50 Marks

PAPER – 1: BASICS CONCEPT OF ECOLOGY

Expected Learning Outcomes

After completing this course, the students can be able to

- Know the basic concepts of ecology
- Understand the ecological energetic and energy flow
- Perceive the knowledge about biomes
- Analsye the concept of community ecology

UNIT –I:

Basic Concepts: Definition, scope and significance of Ecology; Concept of biosphere, atmosphere, lithosphere and hydrosphere; components of atmosphere; concept of habitat and ecological niche. Factors affecting environment: Abiotic factors, edaphic factors, biotic factors.

UNIT –II

Ecological energetic and energy flow–food chain, food web, tropic structure. Concept of productivity: primary, secondary, gross and net. Biogeochemical cycles: Concept, reservoir pool, exchangeable pool, hydrological cycle, gaseous cycles and sedimentary cycles, effect of pollution on biogeochemical cycles.

UNIT-III

Biomes: Concept, Major biomes of the world: forest, desert and grasslands of India.
Development and evolution of ecosystem: Succession – definition, causes and types (hydrosere, lithosere): primary and secondary succession.

UNIT –IV

Community ecology: Concept of community and its characteristics; concept of ecological dominance, species composition. Species diversity in communities. Weed ecology: Concept, impact of weeds in agro ecosystem, forest, grassland and urban ecosystems; intrinsic and extrinsic factors affecting weed population density and spread; menace of PARTHENIUM in India. Concept of ecotypes, ecotones and edge effect.

Reference:

Reference:

1. Peter J. Stoett (2 September 2003).International Relations Theory and Ecological Thought: Towards a Synthesis. Routledge. pp. 25
2. Stadler, B.; Michalzik, B.; Müller, T. (1998). "Linking aphid ecology with nutrient fluxes in a coniferous forest".Ecology **79** (5): 1514–1525.
3. Humphreys, N. J.; Douglas, A. E. (1997). "Partitioning of symbiotic bacteria between generations of an insect: a quantitative study of a Buchnera sp. in the pea aphid (Acyrthosiphon pisum) reared at different temperatures".Applied and Environmental Microbiology **63** (8): 3294–3296.
4. Odum, E. P.; Barrett, G. W. (2005).Fundamentals of Ecology. Brooks Cole. p. 598.
5. Nachtomy, Ohad; Shavit, Ayelet; Smith, Justin (2002). "Leibnizian organisms, nested individuals, and units of selection". Theory in Biosciences **121** (2): 205–230.

6. Holling, C. S. (2004). "Understanding the complexity of economic, ecological, and social systems". Ecosystem**s4** (5): 390–405.
7. Levin, S. A. (1999). Fragile Dominion: Complexity and the Commons. Reading, MA: Perseus Book.
8. Noss, R. F.; Carpenter, A. Y. (1994). Saving Nature's Legacy: Protecting and Restoring Biodiversity. Island Press. p. 443.
9. Noss, R. F. (1990). "Indicators for monitoring biodiversity: A hierarchical approach". Conservation Biology **4** (4): 355–364.
10. Scholes, R. J.; Mace, G. M.; Turner, W.; Geller, G. N.; Jürgens, N.; Larigauderie, A.; Muchoney, D.; Walther, B. A.; Mooney, H. A. (2008). "Toward a global biodiversity observing system" (PDF). Science **321** (5892): 1044–1045.
11. Wilson, E. O. (2000). "A global biodiversity map". Science **289** (5488): 2279. PMID 11041790.
12. Purvis, A.; Hector, A. (2000). "Getting the measure of biodiversity" (PDF). Nature **405** (6783): 212–218.
13. Ostfeld, R. S. (2009). "Biodiversity loss and the rise of zoonotic pathogens" (PDF). Clinical Microbiology and Infection **15** (s1): 40–43
14. Ceballos, G.; Ehrlich, P. R. (2002). "Mammal population losses and the extinction crisis" (PDF). Science **296**(5569): 904–907.
15. Palumbi, Stephen R; S. R., Paul A; Allan, J. David; Beck, Michael W.; Fautin, Daphne G.; Fogarty, Michael J.; Halpern, Benjamin S.; Incze, Lewis S.; Leong, Jo-Ann; et al. (2009). "Managing for ocean biodiversity to sustain marine ecosystem services" (PDF). Frontiers in Ecology and the Environment **7** (4): 204–211.

PAPER II: ENVIRONMENTAL POLLUTION AND SOURCES OF ENERGY

Expected Learning Outcomes

After completing this course, the students can be able to

- Know about atmosphere
- Understand the different types of pollution
- Perceive the sources of energy
- Develop the ability of solid waste management

UNIT-I

Evolution, structure and composition of atmosphere; natural components of air and their resources – biological, geochemical and atmospheric. Air Pollution: sources and types of air pollutants: primary and secondary pollutants; urban air pollution; emissions from automobiles; classical smog, photochemical smog; effect of air pollution on health of man and sensitive areas. Biochemical aspects of CO, O3, PAN, Benzene and metals. Cost of pollution; pollution management techniques.

UNIT-II

Water pollution : Major kinds of water uses – domestic, agricultural, instream and industrial; water pollutants; tolerance limits; effects of water pollution; waste water treatments; possible control measures. Other pollution: Soil pollution, noise pollution, electronic pollution, indoor

pollution, marine pollution; biological pollutants, biosocial pollutants, plastic and other chemical pollutants.

UNIT-III

Solid waste management: Primary waste products – solid waste, toxic – biological and hospital wastes; methods of waste disposal – landfills, incineration, source reduction and recycling. Toxic chemicals hazards: Toxic chemicals, toxic metals, petrochemicals, pesticides, radiations and bio–toxins; movements of toxics through air, water and soil, their ecological effects;

UNIT-IV

Sources of energy: Renewable energy, non renewable sources and techniques of energy conservation; Management and conservation of natural energy resources; priority requirements of conservations at national and international level. Ecological Impact Assessment: Concept and significance; methods of assessment.

Reference:

1. R.A. Horne, (1978). Chemistry of Environment, Wiley-Interscience.
2. A.S. Boughey, (1975). Man and Environment, 2nd Ed., MacMillan Publishing Co. Inc., New York.
3. E.T. Chanlett, (1979). Environmental Protection, 2nd Ed., McGraw-Hill Kogakusha Ltd. I.L.
4. Marr and M.S. Cresser, (1983). Environmental Chemical Analysis, International Textbook Co., New York.
5. C.N. Sawyer and P.L. McCarty, (1978). Chemistry for Environmental Engineers, 3rd Ed. McGraw-Hill Book Co.
6. A.K. Sen, (1988). Environmental Management and Planning, New Age International Publishers (P) Ltd., New Delhi.
7. S.M. Khopkar, (2006). Environmental Pollution, Monitoring and Control, New Age International Publishers (P) Ltd., New Delhi.
8. K.C. Sahu, (1987). Proceedings of Symposium on Role of Earth Sciences in Environment. I.I.T. Press.

PAPER III: ISSUES AND IMPACT IN ENVIRONMENTAL EDUCATION

Expected Learning Outcomes

After completing this course, the students can be able to

- Understand the concept of protection of environment
- Perceive the knowledge of global warming and climate change
- Analyse the ecosystem and energy flow
- Know about the environmental audit and differentiate the types of audit.

UNIT-I

Protection of Environment: International concerns and efforts for environmental protection; role of United Nations; Stockholm summit; priority issues; Rio Summit: Sustainable Development; Earth day; Environment day; ecotourism. Ozone depletion: Ozone as friend and foe; phenomenon, reasons and possible effects on plants, animal and man; measures to check depletion of ozone layer.

UNIT-II

Global warming and climate change: Reasons, possible effects and measures to combat the problem. Biodiversity: Concept, types and significance of biodiversity: conservations strategies; preservation of genetic diversity; global concerns and efforts; national resources conservation policy. Forests: Major forest biomes of the world. Significance of the tropical forests; forestconservations–Indian effort

UNIT –III

Ecosystem: Concept; relationship between ecosystem, organisms and environment. Factors that control cycling of elements in terrestrial ecosystem; natural Vs artificial ecosystem; interaction between biotic and abiotic process (positive and negative feedback). Energy Flow in ecosystem: Sun as source of energy, nature of its radiation, heat budget of earth, earth's temperature and atmosphere, Energy flow models.

UNIT-IV

Environmental Audit: Introduction: Definition; types of auditing, Features of Effective Auditing, Programme planning and organization of Auditing Programme, Pre visit data collection, Auditing Protocol, Onsite Audit; Data Sampling; Inspection and Evaluation and Presentation, Audit Report; Action plan, Management of Audit, Benefits of Environmental Audit, Environmental Audit Programme in India

Reference:

1. Gillis, Justin (2015). "Short Answers to Hard Questions About Climate Change". The New York Times. Retrieved 29 November 2015.
2. Karl, TR; et al., eds. (2009). "Global Climate Change". Global Climate Change Impacts in the United States. Cambridge University Press. ISBN 978-0-521-14407-0
3. Gupta, S. et al. 13.2 Climate change and other related policies, in IPCC AR4 WG3 2007.
4. Hatcher, Bruce Gordon (1990). "Coral reef primary productivity. A hierarchy of pattern and process". Trends in Ecology and Evolution **5** (5): 149– 155.

5. Brown, Thomas C.; John C. Bergstrom; John B. Loomis (2007). "Defining, valuing and providing ecosystem goods and services" (PDF). Natural Resources Journal **47** (2): 329–376.
6. Schindler, David W. (1998). "Replication versus Realism: The Need for Ecosystem-Scale Experiments". Ecosystems **1** (4): 323–334.
7. Carpenter, Stephen R. (1996). "Microcosm Experiments have Limited Relevance for Community and Ecosystem Ecology". Ecology **77** (3): 677–680.
8. Likens, Gene E. (2004). "Some perspectives on long-term biogeochemical research from the Hubbard Brook Ecosystem Study" (PDF). Ecology **85** (9): 2355–2362.

PAPER IV: NATURAL RESOURCES

Expected Learning Outcomes

After completing this course, the students can be able to

- Know about natural resources and their consumption patterns
- Understand the different types of resources.
- Perceive the knowledge of coal mining.

UNIT – I

Introduction to natural resources and their consumption patterns. Types of natural Resources: renewable and non-renewable resources and their limitations. Supply and demand of natural resources. Minerals resources: Their use, Mining and Sustainability. Land Resources: Land as a resource, Land degradation, Man induced landslides, Soil erosion and Desertification.

UNIT – II

Forest Resources**:** Use and over-exploitation, Deforestation and timber extract, Dams and their effect on forest and tribal people. Animal Resources: Utility of animal resources in agriculture, transport and food. Food Resources: World food problems, Changes caused by agriculture and overgrazing, Effect of modern agriculture; Fertilizer-pesticide problems, Water logging; Salinity.

UNIT – III

Energy Resources: Non renewable energy resource: pattern of consumption, issues and options. Fossil fuels: reserves of coal, its classification and basic geology. Types of renewable energy source and their environmental significance. Sustainable development of energy resources.

UNIT – IV

Environmental impact of coal mining, Reserves of oil and gas, basic geology, environmental impact of their production and consumption, Nuclear Energy its resources, Nuclear power plants, Nuclear waste disposal. Geothermal energy: water dominated and vapour dominated systems. Global Energy source: An overview. Global energy consumption and energy conservation. Techniques of Energy conservation. Indian programmes of renewable energy.

Reference:

1. US Geological Survey, 1980, Principles of a Resource/Reserve classification for Minerals, Circular 831.
2. Dill, Harald G. (June 2010). "The "chessboard" classification scheme of mineral deposits: Mineralogy and geology from aluminum to zirconium". Earth-Science Reviews **100** (1-4): 1–420.
3. K.M.V, Jayaram (26 March 2012). "An Overview of World Thorium Resources, Incentives for Further Exploration and Forecasts for Thorium Requirements in the Near Future"(PDF). IAEA.
4. Anthony C. Fisher (1987). "Natural resources," The New Palgrave: A Dictionary of Economics, v. 3, pp. 612–14.
5. João Pedro Galhano Alves (2009). "The artificial simulacrum world. The geopolitical elimination of communitary land use and its effects on our present global condition", Eloquent Books, New York, USA, 71 pp.
6. Dye, S. T. (2012). "Geoneutrinos and the radioactive power of the Earth". Reviews of Geophysics **50** (3).
7. Glassley, William E. (2010). Geothermal Energy: Renewable Energy and the Environment, CRC Press.
8. *Lund, John W. (June 2007),* "Characteristics, Development and utilization of geothermal resources" *(PDF), Geo-Heat Centre Quarterly Bulletin (Klamath Falls, Oregon: Oregon Institute of Technology)* ***28*** *(2), pp. 1–9.*
9. Bain, Alastair S.; et al. (1997). Canada enters the nuclear age: a technical history of Atomic Energy of Canada. Magill-Queen's University Press.