

PH5CRT08: ENVIRONMENTAL PHYSICS AND HUMAN RIGHTS

Vision

The importance of environmental science and environmental studies cannot be disputed. The need for sustainable development is a key to the future of mankind. Continuing problems of pollution, solid waste disposal, degradation of environment, issues like economic productivity and national security, Global warming, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues. The United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 and World Summit on Sustainable Development at Johannesburg in 2002 have drawn the attention of people around the globe to the deteriorating condition of our environment. It is clear that no citizen of the earth can afford to be ignorant of environment issues.

India is rich in biodiversity which provides various resources for people. Only about 1.7 million living organisms have been described and named globally. Still many more remain to be identified and described. Attempts are made to conserve them in ex-situ and in-situ situations. Intellectual property rights (IPRs) have become important in a biodiversity-rich country like India to protect microbes, plants and animals that have useful genetic properties. Destruction of habitats, over-use of energy resource and environmental pollution has been found to be responsible for the loss of a large number of life-forms. It is feared that a large proportion of life on earth may get wiped out in the near future.

In spite of the deteriorating status of the environment, study of environment has so far not received adequate attention in our academic programme. Recognizing this, the Hon'ble Supreme Court directed the UGC to introduce a basic course on environment at every level in college education. Accordingly, the matter was considered by UGC and it was decided that a six months compulsory core module course in environmental studies may be prepared and compulsorily implemented in all the University/Colleges of India.

The syllabus of environmental studies includes five modules including human rights. The first two modules are purely environmental studies according to the UGC directions. The second two modules are strictly related with the core subject and fifth module is for human rights.

Objectives

- Environmental Education encourages students to research, investigate how and why things happen, and make their own decisions about complex environmental issues by developing and enhancing critical and creative thinking skills. It helps to foster a new generation of informed consumers, workers, as well as policy or decision makers.
- Environmental Education helps students to understand how their decisions and actions affect the environment, builds knowledge and skills necessary to address complex environmental issues, as well as ways we can take action to keep our environment healthy and sustainable for the future. It encourages character building, and develops positive attitudes and values.
- To develop the sense of awareness among the students about the environment and its various problems and to help the students in realizing the inter-relationship between man and environment and helps to protect the nature and natural resources.

- To help the students in acquiring the basic knowledge about environment and the social norms that provides unity with environmental characteristics and create positive attitude about the environment.

Module I (15 Hours)

Water Resources and Its Management (3 Hours)

Water resources: Use and over-utilization of surface and ground water, floods, drought, dams-benefits and problems. Water harvesting-Importance of rain water harvesting in Kerala.

Remote sensing (3 Hours)

Remote sensing-principles, spectral reflectance of earth's surface features, Remote sensing satellites and sensors, aerial photography, Applications of Remote Sensing in environmental monitoring and assessment.

Environmental Pollution (9 Hours)

Environment and human health; Environmental pollution- Primary and secondary pollutants; Air pollution- Sources, Effects and Control/Treatment methods; Acid Rain; Ozone layer depletion; Green house gases; Global warming - Climatic effects; Water pollution- Sources, Effects and Control/Treatment methods; Groundwater pollution; Marine pollution; Soil pollution; Noise pollution- Sources and measurement indices of noise pollution, Noise exposure level and standards, Noise control measures, Impact of noise on human health, ; Environmental pollution due to environmental disasters; Consumerism and waste products; E-waste-an emerging environmental threat. Disaster management: floods, earthquake, cyclone and landslides.

Module II (12 Hours)

Waste Management (8Hours)

Waste minimization and resource conservation:- Source reduction, Recycling, Value-added products; Waste minimization promotional methods- awareness generation, control methods and economic benefits; Benefits of waste minimization; Management of solid wastes- Municipal solid wastes, Hazardous solid waste-characteristics and management of HSW, Waste treatment and disposal methods- physical, biological and chemical process.

Environment Impact Assessment and Control (4 Hours)

Basic ideas of environment impact assessment; Environment ethics; Environmental laws and constitutional provisions to control pollutions in India-The general acts; Air (prevention and control of pollution) act; Water (prevention and control of pollution) act; Wild life protection act; Forest conservation act; Environment protection acts.

Module III (13 Hours)

Non-renewable and Renewable Energy Sources (13 Hours)

Non-renewable energy sources:-Coal, Oil, Natural gas; Nuclear fission energy; Merits and demerits of non-renewable energy.

Renewable energy sources: Biomass energy- Biofuels, Biogas plant - Fixed dome type and moving drum type; Wind energy; Wave energy; Tidal energy; Hydroelectricity; Geothermal

energy conversion; Ocean thermal energy conversion; Fusion energy; Hydrogen energy- Production and storage; Merits and demerits of each renewable energy sources; Storage of intermittently generated renewable energy.

Module IV (14 Hours)

Solar energy (14 Hours)

Sun as a source of energy- Solar radiation, Solar Constant, Spectral distribution; Solar pond - Convective and salt gradient types; Flat plate collector; Solar water heater - Direct and indirect systems- Passive and active systems; Optical concentrator - Parabolic trough reflector - Mirror strip reflector - Fresnel lens collector; Solar desalination; Solar dryer - Direct and indirect type; Solar cooker; Solar heating of buildings; Solar green houses; Need and characteristics of photovoltaic (PV) systems; Solar cells - Principle, Equivalent circuits, V-I characteristics, fill factor, conversion efficiency; PV Sun tracking systems; Merits and demerits of solar energy.

Module - V (18 Hours)

Unit 1 - Human Rights

An Introduction to Human Rights, Meaning, concept and development –History of Human Rights-Different Generations of Human Rights- Universality of Human Rights- Basic International Human Rights Documents - UDHR ,ICCPR,ICESCR.-Value dimensions of Human Rights

Unit 2 - Human Rights and United Nations

Human Rights co-ordination within UN system- Role of UN secretariat- The Economic and Social Council- The Commission Human Rights-The Security Council and Human rights-The Committee on the Elimination of Racial Discrimination- The Committee on the Elimination of Discrimination Against Women- the Committee on Economic, Social and Cultural Rights- The Human Rights Committee- Critical Appraisal of UN Human Rights Regime.

Unit 3- Human Rights National Perspective

Human Rights in Indian Constitution – Fundamental Rights- The Constitutional Context of Human Rights-directive Principles of State Policy and Human Rights- Human Rights of Women-children –minorities- Prisoners- Science Technology and Human Rights- National Human Rights Commission- State Human Rights Commission- Human Rights Awareness in Education.

Reference Books:

1. Non-conventional energy sources - G.D Rai- Khanna Publishers, New Delhi
2. A textbook of Environmental Studies- E Bharucha - University Grants Commission, 2004
3. Environmental Science: Principles and Practice- R.C. Das and D.K. Behera - PHI Learning Pvt. Ltd
4. Renewable Energy Sources and Emerging Technologies: Edition 2, D.P. Kothari K. C. Singal, Rakesh Ranjan - PHI Learning Pvt. Ltd, 2011.

5. Solar energy - M P Agarwal - S Chand and Co. Ltd.
6. Solar energy - Suhas P Sukhative Tata McGraw - Hill Publishing Company Ltd.
7. Renewable Energy, Power for a sustainable future, Edited by Godfrey Boyle, Oxford University Press, 2012.
8. Solar Energy: Resource Assesment Handbook- Dr. P Jayakumar APCTT 2009
9. A textbook of Environmental Studies- S.Satyanarayan, S.Zade, S.Sitre and P.Meshram - Allied Publishers, New Delhi, 2009
10. Remote Sensing: Principles and Interpretation, Floyd F. Sabins, Waveland Pr Inc; 3 edition (2007)

Human Rights

1. Amartya Sen, The Idea Justice, New Delhi: Penguin Books, 2009.
2. Chatrath, K. J.S., (ed.), Education for Human Rights and Democracy (Shimla: Indian Institute of Advanced Studies, 1998)
3. Law Relating to Human Rights, Asia Law House, 2001.
4. Shireesh Pal Singh, Human Rights Education in 21st Century, Discovery Publishing House Pvt.Ltd, New Delhi,
5. S.K.Khanna, Children and the Human Rights, Common Wealth Publishers, 1998. 2011.
6. Sudhir Kapoor, Human Rights in 21st Century, Mangal Deep Publications, Jaipur, 2001.
7. United Nations Development Programme, Human Development Report 2004: Cultural Liberty in Today's Diverse World, New Delhi: Oxford University Press, 2004.