

## **B. Sc DEGREE PROGRAMME MATHEMATICS (UGCBCS 2017)**

### **FIFTH SEMESTER**

#### **MM5CRT04 : ENVIORNMENTAL MATHEMATICS & 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 Janerio 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 have 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 have 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, encourage character building, and develop 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 for protecting the nature and natural resources.

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

**4 hours/week (Total Hrs: 72)**

**4 credits**

## **SYLLABUS**

Text Books :

1. Bharucha Erach – Text book of Environmental studies for UG Courses, University Press, II Edition
2. Thomas Koshy : Fibonacci and Lucas numbers with applications, John Wiley & Sons, Inc (2001).

### **Module I: Environment and its resources**

**( 10 hours )**

#### **Multidisciplinary nature of environmental studies:**

Definition, scope and importance  
Need for public awareness.

#### **Natural Resources :**

Renewable and non-renewable resources : Natural resources and associated problems.

- a) Forest resources : Use and over-exploitation, deforestation, case studies.  
Timber extraction, mining, dams and their effects on forest and tribal people.
- b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- e) Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
- f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification

Role of individual in conservation of natural resources.

Equitable use of resources for sustainable lifestyles.

( Text 1- unit 1- sections 1.1,1.2,unit 2-sections 2.1,2.2,2.3,2.4)

### **ModuleII: Environmental Pollution and Social Issues**

**(14 hours)**

**Pollution-** Definition, Causes, effects and control measures of:

- a. Air pollution
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution

g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution

Disaster management: floods, earthquake, cyclone and landslides.

(Text 1. -unit 5-sections 5.1, 5.2, 5.3, 5.4, 5.6 )

### **Social Issues and the Environment:**

Urban problems related to energy

Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people: its problems and concerns, Case studies

Environmental ethics: Issues and possible solutions

Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and

Holocaust, Case studies

Consumerism and waste products

Public awareness

( Text1. unit6--sections 6.1, 6.2, 6 .4, 6.5,6.6,6.15)

### **Module III : Fibonacci Numbers in nature**

**( 15 hours)**

#### **The rabbit problem:**

The rabbit problem, Fibonacci numbers, recursive definition, Lucas numbers, Different types of Fibonacci and Lucas numbers.

#### **Fibonacci numbers in nature :**

Fibonacci and the earth, Fibonacci and flowers, Fibonacci and sunflower, Fibonacci, pinecones, artichokes and pineapples, Fibonacci and bees, Fibonacci and subsets, Fibonacci and sewage treatment, Fibonacci and atoms, Fibonacci and reflections, Fibonacci, paraffins and cycloparaffins, Fibonacci and music, Fibonacci and compositions with 1's and 2's

#### **The Euclidean Algorithm:**

The Euclidean Algorithm and Lucas Formula

#### **Solving Recurring relations:**

Linear homogeneous recurrence relations with constant coefficients

Text 2 : Chapters 2 & 3 (excluding Fibonacci and poetry, Fibonacci and electrical networks), Chapters 9 & 10.

### **Module IV : Golden Ratio**

**( 15 hours )**

#### **The golden ratio:**

The golden ratio, mean proportional, a geometric interpretation, ruler and compass construction, Euler construction, generation by Newton's method.

### **The golden ratio revisited:**

The golden ratio revisited, the golden ratio and human body, golden ratio by origami, Differential equations, Gattei's discovery of goldenratio, centroids of circles,

Text 2 : Chapters 20, 21

## **Module V : Human rights**

**(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.

### **References**

1. Bharucha Erach, Text Book of Environmental Studies for undergraduate Courses. University Press, IInd Edition 2013 (TB)
2. Clark.R.S., Marine Pollution, Clanderson Press Oxford (Ref)
3. Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T.2001Environmental Encyclopedia, Jaico Publ. House. Mumbai. 1196p .(Ref)
4. Dc A.K.Environmental Chemistry, Wiley Eastern Ltd.(Ref)
5. Down to Earth, Centre for Science and Environment (Ref)
6. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge University Press 1140pb (Ref)
7. Jadhav.H & Bhosale.V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p (Ref)
8. Mekinney, M.L & Schock.R.M. 1996 Environmental Science Systems & Solutions. Web enhanced edition 639p (Ref)
9. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)
10. Odum.E.P 1971. Fundamentals of Ecology. W.B. Saunders Co. USA 574p (Ref)
11. Rao.M.N & Datta.A.K. 1987 Waste Water treatment Oxford & IBII Publication Co.Pvt.Ltd.345p (Ref)

12. Rajagopalan. R, Environmental Studies from crisis and cure, Oxford University Press, Published: 2016 (TB)
13. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut (Ref)
14. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (Ref)
15. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (Ref)
16. Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (Ref)
17. Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (Ref)

(M) Magazine (R) Reference (TB) Textbook

### 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 21 st 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 21 st 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.

### QUESTION PAPER PATTERN

Module	Part A 2marks	Part B 5 marks	Part C 15 marks	Total
I	3	2		5
II	3	2	1	6
III	2	2	1	5
IV	2	2	1	5
V	2	1	1	4
Total No. of questions	12	9	4	25
No.of questions to be answered	10	6	2	18
Total marks	20	30	30	80