THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc., ENVIRONMENTAL MANAGEMENT

DEGREE COURSE

CBCS PATTERN

(With effect from 2017-2018)

The Course of Study and the Scheme of Examinations

S.NO	Part	Study Components / Course Title		Ins.hrs /week	Credit	Title of Paper	Maximum Marks		
SEMESTER I							CIA	Uni. Exam	Total
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	7	4	Basics of Earth science	25	75	100
	III	Core Practical	Practical-1	2	-	Basics of Earth Science	-	-	-
4	III	Allied -1		5	4	Biological Environment-I	25	75	100
	III	Allied -1 Practical	Practical-1	2	-	Biological Environment-I	-	-	-
5	IV	Environmental Studies		2	2	Environmental Studies	25	75	100
				30	**18**		**125**	**375**	**500**
SEMESTER II							CIA	Uni. Exam	Total
6	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
7	II	English	Paper-2	4	4	English	25	75	100
8	III	Core Theory	Paper-2	7	4	Environmental Ecology	25	75	100
9	III	Core Practical	Practical-1	2	4	Basics of Earth Science and Environmental Ecology	25	75	100
10	III	Allied -1	Paper-2	5	4	Biological Environment-II	25	75	100
11	III	Allied -1 Practical	Practical-1	2	2	Biological Environment-I&II	25	75	100
12	IV	Value Education		2	2	Value Education	25	75	100
13	IV	Soft Skill		2	1	Soft Skill	25	75	100
				30	**25**		**200**	**600**	**800**

SEMESTER III							CIA	Uni. Exam	Total
14	III	Core Theory	Paper-3	5	3	Environmental Chemistry	25	75	100
15	III	Core Theory	Paper -4	5	3	Solid Waste and Hazardous Waste Management	25	75	100
16	III	Core Theory	Paper-5	5	3	Bio-Statistics, Mathematical Modeling and Computers in Environment	25	75	100
	III	Core Practical	Practical-2	3	-	Environmental Chemistry and Computer Science	-	-	-
17	III	Allied -2	Paper-3	7	4	Environmental Economics	25	75	100
18	IV	Skill Based Subject	Paper-1	3	3	Environmental Geo science and GIS	25	75	100
19	IV	Non-Major elective	Paper-1	2	2	Global Warming and Climate Change	25	75	100
				30	**18**		**150**	**450**	**600**
SEMESTER IV							CIA	Uni. Exam	Total
20	III	Core Theory	Paper-6	5	4	Natural Resources and Management	25	75	100
21	III	Core Theory	Paper-7	5	4	Environmental Microbiology	25	75	100
22	III	Core Theory	Paper-8	5	3	Environmental Quality and Pollution Monitoring Techniques	25	75	100
23	III	Core Practical	Practical-2	-	4	Environmental Chemistry and Computer Science	25	75	100
24	III	Core Practical	Practical-2	3	4	Environmental Microbiology and Pollution Monitoring Techniques	25	75	100
25	III	Allied -2	Paper-4	7	4	Environment and Eco-Tourism	25	75	100
26	IV	Skill based Subject	Paper-2	3	3	Aquaculture and Environment	25	75	100
27	IV	Non-Major elective	Paper-2	2	2	Occupational Safety, Health and Management	25	75	100
				30	**28**		**200**	**600**	**800**
SEMESTER V							CIA	Uni. Exam	Total
28	III	Core Theory	Paper-9	6	5	Environmental Laws, Policies and Treaties	25	75	100
29	III	Core Theory	Paper-10	6	5	Environmental Pollution and Management	25	75	100
30	III	Core Theory	Paper-11	6	5	Environmental Impact Assessment	25	75	100
	III	Core Practical	Practical-3	3	-	Pollution Management	-	-	-
31	III	Elective	Paper-1	6	3	Principles of Sustainable Development and Management	25	75	100
32	IV	Skill based subject	Paper-3	3	3	Forest Conservation & Management	25	75	100
				30	**21**		**125**	**375**	**500**

SEMESTER VI							CIA	Uni. Exam	Total
33	III	Core Theory	Paper-12	5	4	Conservation Biology and Management	25	75	100
34	III	Core Theory	Paper-13	5	4	Natural Hazard and Disaster Management	25	75	100
35	III	Core Theory	Paper-14	5	4	Environmental Safety, Health and Management	25	75	100
36	III	Core Practical	Practical-4	-	5	Pollution Management	25	75	100
37	III	Core Project	Paper-15	12	9	Project	50	150	200
40	IV	Skill based Subject	Paper-4	3	3	Environmental Biotechnology & Herbal science	25	75	100
41	V	Extension Activities		-	1		100	-	100
				30	**30**		**275**	**525**	**800**

Part	**Subject**	**Papers**	**Credit**	**Total Credits**	**Marks**	**Total Marks**
Part I	Languages	2	4	8	100	200
Part I	English	2	4	8	100	200
Part III	Allied (Odd Sem.)	2	4	8	100+100 (I+III Sem.)	200
	Allied (Even Sem.)	2	4	8	100+100 (II+IV Sem.)	200
	Allied-Practical (Even Sem.)	1	2	2	100	100
	Electives	1	3	3	100	100
	Core	14	(3-7)	55	100	1400
	Core Practical	4		17	100	400
	Core Project	1	6	9	200	200
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang & Others/ NME	2	2	4	100	200
	Skill Based	4	3	12	100	400
Part V	Extension	1	1	1	100	100
	Total	**39**		**140**		**4000**

THIRUVALLUVAR UNIVERSITY

B.Sc., ENVIRONMENTAL MANAGEMENT

SYLLABUS

CBCS PATTERN

(With effect from 2017 - 2018)

SEMESTER I

CORE PAPER - 1

BASICS OF EARTH SCIENCE

UNIT I

Earth – It's interior and surface: The Universe – Big bang theory – Meteors. The origin, shape and size of the earth. The solar system – planets. Eclipses –Solar, Lunar – Latitudes and Longitudes – Layers of the Earth – Sial, Sima, and Nife – Origin of the continents and oceans.

UNIT II

Earth's crust: Formation of rocks – Igneous rocks – Intrusive and Extrusive; Plutonic and Dyke rocks – Acid and Basic rocks – Sedimentary rocks: Inorganic and organic – Sandstones – Shales – Conglomerates – Metamorphic rocks - Marble, slate and schist.

UNIT III

Major land forms and their transformation – Stages of Mountain buildings – Classification of Mountains – Fold Mountains – Block Mountains –Isostasy - Types of Plateau - Plains Classification – Destructional, Coastal and Desert Plain.

UNIT IV

Denudation and its agents: Weathering physical, chemical and biological – Agents of Denudation: Running water, moving ice, wind and waves – Ocean trough – Ocean Deep – Salinity and Temperature of Ocean Water – Ocean Deposits.

UNIT V

Soil and its types – Composition – Soil organic matter – Formation of soil – Soil profile and Soil horizons – Texture of the Soil – Soils of the World – Black Cotton Soil, Pod sols, Prairie Soils, Chestnut Soils.

REFERENCE:

1. Das Gupta, A. and A.N. Kapoor (1999), Principles of Physicals geography, Twentieth Edition, S. Chand & Co Ltd, New Delhi.
2. Kelber, E.A. (2005). Introduction to Environmental Geology, Prentice Hall Pub, New York.
3. De Blij, H.J. and Peter O, Muller (1993), Physical Geography of the Environment. John Willey & Sons Inc. Brisbane.
4. Strahler and strahler (1970) Environmental geology. Willey & Sons, New York.
5. Dara, S.S. (1993), A Textbook of Environmental Chemistry and Pollution Control, S. Chand and Company Limited, New Delhi.

ALLIED – 1

BIOLOGICAL ENVIRONMENT - I

UNIT I

Bacterial Diseases – Cholera – Typhoid – Tuberculosis – Causes – Treatment- Preventive Measures – Impact on Environment – Viral Diseases – Small Pox – Measles – Rabies– Causes – Effects – Treatment – Preventive Measures – Methods of Diagnosis – Parasitic Diseases- Examination of Blood thick smear and thin smear method –Examination of stools – Direct Examination – Sedimentation Techniques – Floating Techniques – Bacterial Examination – Gram positive – Gram negative method.

UNIT II

Population Explosion – Causes- Impacts on Environment – Family Welfare Programme- Objectives of Family Planning – Measures adopted by the Government to control Population growth. Need for Family welfare programme– Family Planning activity – environment and Human health – Women welfare – Women Empowerment. Child abuse – Cruelty on children – Child welfare – organization on child welfare – Acts for child welfare – Child welfare programme.

UNIT III

Evolution – Definition – Origin of Life – Theories of Evolution – Lamarck – Theory of use and disuse – Theory of inheritance of acquired characters – Neo Lamarckism- Darwin's theory of Natural selection – Variation – Geometric ratio of increase in production – Struggle for existence – Survival of the fittest – Sexual selection.

UNIT IV

Animal distribution – Definition – Classification of Animal distribution- Patterns of distribution – Cosmopolitan distribution –Discontinuous distribution – Bipolar distribution-isolation distribution-factors affecting distribution- factors influencing distribution.

UNIT V

Economic zoology-productive insects-Honey bee-Silk worm -Lac insects-Honey bee culture-production of honey-Economic importance of Honey.Silk worm culture-production of Silk-Economic importance of Silk-Lac culture-production of lac- Economic importance of Lac.

REFERENCE

1. Verma, P.S., V.K. Agarwal and B.S. Tyagi (2002) Animal Physiology and Ecology, - S.Chand and Company, New Delhi.
2. K.R. Raavindranath 2005 Economic Zoology Dominant publishers New Delhi.
3. Jayaraj, (1988) Fundamentals of Ecology – Veer BalaRastogi, S.Chand and Company, New Delhi.
4. J.E. Park and K. Park, 2001. Textbook of Preventive and Social Medicine, 17th edition.
5. N. Arumugam. 2001. Organic Evolution, Saras Publications.

SEMESTER II

CORE PAPER - 2

ENVIRONMENTAL ECOLOGY

UNIT I

Ecology – Definition – Subdivisions of Ecology – Autecology – Synecology – Branches of Ecology – Scope and Importance of Ecology – Environmental Factors – Biotic and Abiotic Factors – Temperature – Light.

UNIT II

Ecosystem – Structure of Ecosystem – Principle steps and Components of an Ecosystem – Ecosystem Types – Aquatic Ecosystem – Pond Ecosystem – Functions of Ecosystem – Energy – Food Chain – Food Web – Ecological Pyramids – Pyramid of Number, Biomass and Pyramid of Energy – Inverted Pyramids.

UNIT III

Population Ecology – Characteristics of Population – Natallity – Mortality – Age Distribution - Age Pyramids– Survivorship Curves – Population Dispersal - Population Growth Forms – Carrying Capacity – Ecological Adaptations – Hydrophytes – Morphology and Anatomy – Mesophytes – Morphology and Anatomy – Xerophytes – Morphology and Anatomy – Halophytes Morphology and Anatomy.

UNIT IV

Community Ecology – Definition – Ecological Dominants – Ecotone and Edge effect – Ecological Niche – Ecological Equivalents – Ecological Indicators – Ecological Succession – Types – Primary and Secondary Succession – Process of Succession – Nudation – Invasion – Establishment – Competition – Reaction – Stabilization.

UNIT V

Animal Association – Inter Specific Relationship – Neutralism – Symbiosis – Mutualism – Commensalism – Antagonism – Competition, Predation, Antibiosis, Exploitation, Parasitism – Parasitic Adaptations – Intra Specific Relationship.

REFERENCE

1 Jeyaraj 1998 Fundamentals of Ecology – Veer BalaRastogi, S. Chand and Company, New Delhi.
2 Odum, E.P. (1971) Fundamentals of Ecology, W.B. Saunder Company, Philadelphia.
3 Verma P.S and V.K. Agarwal, (1983) Principles of Ecology, S. Chand and Company Ltd, New Delhi.
4 Sharma, P.D 1998, Ecology and Environment, Rastogi Publications, Meerut.
5 Shiva, V and Bandyopadyaya, J. (1986) Chipko, the INTACH, New Delhi.

CORE PRACTICAL

PAPER - 1

BASICS OF EARTH SCIENCE AND ENVIRONMENTAL ECOLOGY

1. Identification of types of Rock-Igneous, Sedimentary and Discuss their properties.
2. Identification of Soil Texture-Clay, Sand, Loamy.
3. Identification of Soil types-Red soil, Black soil.
4. Soil profile-Horizons.
5. Diagrammatic representation of Solar and Lunar Eclipses.
6. Identification of Coal fields – using map.
7. Study on the Morphology and Anatomy of Hydrophytes stem.
8. Study on the Morphology and Anatomy of Petiole.
9. Study on the Morphology and Anatomy of Mesophytes-stem.
10. Study on the Morphology and Anatomy of Xerophytes-stem.

11 &12. Study on the Morphology and Anatomy of Halophytes-Museum and Specimen and Slides.

ALLIED – 1

PAPER - 2

BIOLOGICAL ENVIRONMENT - II

UNIT I

Fundamentals of Classification, Basic unit of Classification – Classification of Plants – Taxonomic Hierarchy – Artificial and Natural Classification, Merits and Demerits.

UNIT II

Prokaryotic and Eukaryotic Cell – Cell Organelles – Mitochondria, Chloroplast and Nucleus, Cell Division – Mitosis – Its Significance.

UNIT III

Anatomy of Dicot Stem, Root – Monocot Stem, Root – Structure and Life History of Gracilaria, Agaricus, Lycopodium and Cycas – Economic Importance of Gracilaria and Agaricus.

UNIT IV

Mendel – Reason for Mendel's success – Characters selected by Mendel – Monohybrid Experiment – Homozygous, Phenotype, Genotype – Back cross & Test cross – Di-hybrid Experiments – Mendel's Laws, Law of Dominance, Law of Segregation and Law of Independent Assortment.

UNIT V

Economic Botany – Medicinal Plants, Edible oil seeds, Pulses, Vegetables, Fruits, Mushroom, Single Cell Protein, Spirulina.

REFERENCES

1. Jeffery, C (1982). An Introduction of Plant Taxonomy, Cambridge, Press.
2. Smith Gilbert, M (1995) Cryptogrammic Botany, VOL 1&2, McGraw Hill, New York.
3. Verma, P.S and V.K. Agarwal, (1989) Principles of Ecology, S. Chand & Company, New Delhi.
4. Hill, A.W (1951) Economic Botany, McGraw Hill Publications.
5. Dash, M.C (1995) Fundamentals of Ecology, McGraw Hill Publications.

ALLIED PRACTICAL I

BIOLOGICAL ENVIRONMENT I AND II

1. Demonstration of Microscope.
2. Identification of Mendelian Population – Dominant – Recessive by P.T.C Test.
3. Identification of Blood groups-A, B, AB, O.
4. Preparation of Thick and Thin smear of Blood.
5. Study of any one Water borne disease – Bacterial disease.
6. Micro preparation and Anatomy of Dicot stem.
7. Micro preparation and Anatomy of Dicot root.
8. Squash preparation of Onion root tip for Mitosis.
9. Identification of Museum and Live specimen-Gracilaria, Agaricus.
10. Identification and Micro preparation of Lycopodium stem T.S, Strobilus L.S and Sporophyte
11. Identification and Micro preparation of Cycas leaflet T.S, Microsporophyll and Megasporophyll.
12. Identification of Slides and Specimens Cycas - Corolloid root –T.S.

SEMESTER III

CORE PAPER - 3

ENVIRONMENTAL CHEMISTRY

UNIT I

Fundamental concepts in Environmental Chemistry – Environmental segments – structure and composition of Atmosphere – contaminants – pollutants – sinks-receptor – Dissolved Oxygen – Biochemical Oxygen Demand – Chemical Oxygen Demand. Air pollution – gases and particulates- Effects of Radioactive pollution – Hiroshima – Nagasaki Episode – Chernobyl disaster (1986).

UNIT II

Soil – Structure – Texture – Organic matter – Soil nutrients – Plastic pollution – Effect of plastic pollution – control measures. Eco-friendly alternatives for plastics – Eco products – Legislative control of plastic pollution.

UNIT III

Renewable and Non-Renewable Energy – Conventional energy – Oil, Petroleum and Natural gas – Non-conventional energy – Solar, Wind, Tide, Hydroelectric power, Biogas and Bio fuel – Alternative energy resources – Need for Alternative energy resources – Use of Alternative energy resources.

UNIT IV

Environmental Toxicology – Basic concepts – Classification of Toxicants – Toxic response – Mechanism of Toxicity – Acute – Sub-acute – Chronic – LC50 and LD50 –TLV(Threshold Limit Value) –Bio-accumulation and Bio-magnification – Toxins – Exotoxins – Endotoxins – Algal, Fungal and Bacterial toxins. Toxic chemicals in the Environment – Teratogens, Mutagens and Carcinogens – Toxico-kinetics and Toxico-dynamics.

UNIT V

Pesticides – Biochemical effects of Pesticides – Heavy metals – Cadmium – Itai-Itai disease – Mercury-Minamata disease – Lead – Chromium – Zinc – Impact of heavy metals on man and animals – Thalidomide tragedy – Bio-chemical Effects of Carbon monoxide and Sulphur di-oxide.

REFERENCE

1. Girard, J. 2013. Principles of Environmental Chemistry (3rd edition). Jones & Bartlett.
2. Pani, B. 2007. Textbook of Environmental Chemistry. IK international Publishing House.
3. Casseret, L.J and Doull, J. 1982. Toxicology. The basic science of Poisons. Macmillan publishers, New York.
4. De. A.K. 2003. Environmental Chemistry, Wiley Eastern Limited, New Delhi.
5. Sharma. B. K. 1990. Instrumental Method of Chemical Analysis, Geol. Publishing House, Meerut.

CORE PAPER - 4
SOLID WASTE AND HAZARDOUS WASTE MANAGEMENT

UNIT I

Definition of Solid Waste – Types and sources of solid waste – Domestic, Municipal, Agricultural, Industrial, and Mining –Physico-chemical characteristics of solid waste – solid waste generation – Problem and impact of municipal solid waste – Methane gas emission due to MSW.

UNIT II

Disposal of solid waste – Collection – Process of collection – Segregation of waste – The role of Rag pickers – Biodegradable – Non-biodegradable – Reusable – Recyclable-Non recyclable-Combustible- Noncombustible-Hazardous.

UNIT III

Solid waste processing technologies-Open dumping-Incineration-Types of incinerators-Waste to energy – Sewage sludge onsite incinerators - Pyrolysis - Landfill-Landfill regulation-Emission, Leachate and Monitoring-Composting-Aerobic composting-Anaerobic composting-Vermi composting - Solid Waste Rule (2005).

UNIT IV

Hazardous waste- Definition – Waste dumping site, Storage, Transport-Handling of wastes – Grant of authorization for handling hazardous waste-packing, Labelling and Transport – Disposal site – Import and Export of hazardous waste, Hazardous Waste (management and handling) Rule 1989.

UNIT V

Biomedical waste: Definition – Collection, Packing, Transportation and Storage – Categories of Biomedical waste – Colour coding and Types of Container for Disposal of Biomedical waste (management and handling) Rule 1988.

REFERENCE

1. Asnani, P. U. 2006. Solid waste management. India Infrastructure Report570.
2. Bagchi, A. 2004. Design of Landfills and Integrated Solid Waste Management. John Wiley & Sons.
3. Blackman, W.C. 2001. Basic Hazardous Waste Management. CRC Press.
4. McDougall, F. R., White, P. R., Franke, M., &Hindle, P. 2008. Integrated Solid Waste Management: A Life Cycle Inventory. John Wiley & Sons.
5. US EPA. 1999. Guide for Industrial Waste Management. Washington D.C.

CORE PAPER 5

BIOSTATISTICS, MATHEMATICAL MODELLING AND COMPUTERS IN ENVIRONMENT

UNIT I

Data – Methods of Collection – Classification – Tabulation – types of tables. Diagrammatic and Graphical representation.

UNIT II

Measures of central tendency – Calculation of Mean, Median and Mode, Moments, skewness and Kurtosis. Measures of dispersion – range and deviation, Mean deviation, Standard deviation and standard error.

UNIT III

Mathematical ecology, Classification of Mathematical Modelling, Process of modelling population growth model. Population interaction Lotka and Voltera prey predator system, point source stream pollution model, box model energy flow in multi ecosystem.

UNIT IV

Introduction and basic concepts of computer, Parts of computer, types of computer number system. Computer organization, Software, computer virus language and its application

UNIT V

Basic principles of a digital computer. Compression of hardware and software. Computer operating systems – WINDOWS - MS Word, Excel-power point. Network-Internet, World Wide Web, Search Engines, E-mail. Applications of Computer in Environmental Science; use of Computer in Environmental Modelling.

REFERENCE

1. Palanisamy. M (1989) A Text book of statistics, paramount publication, palani.
2. Vittal, R.R(1986)Business Mathematics and Statistics, Murugan Publications.
3. Sanjay saxena (2003)A First Course in computers, Vikas publishing house Pvt. Ltd, New Delhi
4. Computerized environmental modelling –J. Hardstay , D.M. Tailor &S.E. Metcalf
5. Computerized aided environmental management –S.A. Abbassi and F. I. Khan.

ALLIED - 2

PAPER - 3

ENVIRONMENTAL ECONOMICS

UNIT I

Definition and Scope Environmental Economics: Introduction – Economics and Environment – Definition of environmental Economics – Scope and significance of Environmental Economics: Environment Inter -Linkages – Market Failure and externality – Accounting for the Environment –Pareto Optimality – Individual Choice Vs. Social Choice.

Unit II

Resources Economics: Natural Resources: Types and classification – Economics of Natural Resources Exploitation - uses of Environment: Use value, Existence value and optional value – Market Structure and the Exploitation of Non-Renewable Resources.

Unit III

Conservation of Resources: Definition and Meaning – Material Substitution – Product Life Extension – Recycling – Optimum recycling – Waste Management.

Unit IV

Production and Consumption Oriented Approaches to Environmental Issues in Indian as well as Global Context – Impact of Industry and Technology on Environment, Urban Sprawl, Traffic Congestion and Social Economic Problems – Conflict between Economic and Environmental Interests.

Unit V

Inequalities of Race, Class, Gender, Region and Nation – State in access to Healthy and Safe Environment – History and Politics Surrounding Environmental, Ecological and Social Justice – Environmental Ethics – Issues and Possible Solutions – Environmental Education and Awareness.

REFERENCE

1. Nick Hanley, Jainson F, Shorgen and Ben White (1999) Environmental Economics – In theory and practice. Macmillan India Ltd, New Delhi.
2. John Bowers (1997) sustainability and Environmental Economics, addition Weley Longman Ltd, Singapore.
3. David W. Peatce and Kerry R. Turner (1999) Economics of natural Resources and the Environment , The Johns Hopkins University Press, Baltimore.
4. Kerry R. Turner, David W. Pearce and Ian Bateman (1993) Environmental Economics – Elementary Introduction. The Johns Hopkins University Press, Baltimore.
5. Jeyaraj, 1998. Fundamentals of Ecology – Veer BalaRastogi, S. Chand and Company, New Delhi.

SKILL BASED SUBJECT

PAPER - 1

ENVIRONMENTAL GEO - SCIENCE AND GIS

UNIT I

Structure and Composition of Lithosphere – Continent and oceans – Temperature of the atmosphere – Inversion of Temperature and Pressure – El-Nino phenomenon – Hydrological cycle – Movement of Oceans-Currents-Tides-Drifts and Creep – Layers of Earth – Trace elements–Minerals.

UNIT II

Geochemical and geological process – Exogenic – Endogenic – Volcanoes – Origin and Types of Volcanoes – Volcanoes and Landscape – Distribution of Volcanoes – Earthquakes-Origin – Causes – Epicentre – Seismology – Richter scale – Effect of Earthquake on Environment – Tsunami-2004Tamilnadu and their impact on Flora and Fauna and Human beings.

UNIT III

Winds-Variable Winds – Doldrums – Cyclone and Anticyclones – Moisture in the Atmosphere – Humidity – Evaporation-Clouds – Cirrus – Cumulus – Nimbus – Stratus – Rainfall – Types of rainfall – Chief factors of climate control.

UNIT IV

Geographical Information System – Definition – Terminology – Concepts and components of GIS – Digitizer – Scanner– Fundamentals of Operation – Types of GIS – Integrated GIS.

UNIT V

Applications of GIS in Environmental Management – Ecosystem Studies – Climate change and its impact on Biodiversity Assessment – Disaster Mitigation and Management – Health management – Wet land management – Coastal zone management – Agriculture.

REFERENCE

1. Zar, J.H. 2010. Biostatistical Analysis (5^{th} edition). Prentice Hall Publication
2. Demers, M.N. 2005. Fundamentals of Geographic Information System. Wiley & Sons.
3. Richards, J. A. &Jia, X. 1999. Remote Sensing and Digital Image Processing. Springer.
4. Sabins, F. F. 1996. Remote Sensing: Principles an Interpretation. W. H. Freeman.
5. Das Gupta , A and A.N. Kapoor 1999 Principles of Physical Geography, S.Chand and co Ltd. New Delhi.

NON-MAJOR ELECTIVE
PAPER - 1
GLOBAL WARMING AND CLIMATE CHANGE

UNIT I

Role of Ozone in Environment – ozone layer –ODS (Ozone Depleting Substances) – HCFC –Green House Effect– Ozone Friendly Substances –Asian Brown clouds – EL Nino, La Nino.

UNIT II

Temperature Profile of the Atmosphere – Lapse Rate – Temperature Inversion – Effects of Inversion on Pollution Dispersion.

UNIT III

Global Warming and Climate Change –Causes of Climate change: Change of Temperature in the Environment – Melting of Ice Pole – Sea Level Rise – Role of Fossil fuels.

UNIT IV

Climate Change –Mitigation Measures – Carbon Credit – Carbon Trading – Cleaner Development Mechanism CDM – Cleaner Production – Alternative fuel measures – Bio fuels – Bio ethanol –Biodiesel.

UNIT V

Kyoto protocol – Intergovernmental Panel on Climate Change (IPCC) – UNFCC 1992 – Montreal Protocol 1987 – Paris Convention 2016.

REFERENCE

1. Annon 1996. Climate change 1995: Adaption and mitigation of climate change Scientific Technical Analysis .Cambridge University Press, Cambridge.
2. Annon 2001. Intergovernmental Panel on Climate change (IPCC) climate change 2001. Third Assessment Report (volume i). Cambridge University Press, Cambridge.
3. Annon 2005. World Health Organization. Climate and Health, Fact sheet, July.
4. Gosian, A.K. and Rao.S2003. Climate change and India: Vulnerability Assessment and Adaption. Eds. Shukla, P.R. Universities Press Pvt. Ltd. Hyderabad. Pp462.
5. Houghton. J (2005) Global Warming: The Complete Briefing. Cambridge: Cambridge

SEMESTER IV

CORE PAPER - 6

NATURAL RESOURCES AND MANAGEMENT

UNIT I

Introduction to Natural Resources- Classification of Natural Resources-Values of Natural Resources-Demands on Natural Resources-Impacts of poor Natural Resources management –Role of individuals in the Conservation of Natural Resources.

UNIT II

Land Resources-Land Definition- Land Degradation- Soil Erosion-Types of Soil Erosion-Causes- Effects-Soil Conservation Methods-Wasteland Reclamation-NWDB- National Wasteland Development Board- Desertification- Causes and Impact on Environment.

UNIT III

Water Resources – Hydrological Cycle – Surface Water – Ground Water – Impacts of Over utilization of Ground Water – Water Resources Management – Drought – Causes and Effects – Drought Management – Advantages and Disadvantages of Dams Construction – Rain Water Harvesting.

UNIT IV

Living resources – Agriculture – Types of Cultivation – HYV-HIGH YIELDING VARITIES – Impact of Chemical Fertilizers on Soil – Water Logging – Salinity – Causesand Effects of Over-grazing – Useful and Harmful Bacteria in soil – Impacts of Modern Agriculture on Environment

UNIT V

Forest and Mineral Resources – Usesof Forest and Forest Products – Commercial Benefits – Deforestation – Causes, Impacts – Prevention. Forest Management – Social Forestry – Chipko Movement – Mineral – Metallic and Non-metallic Minerals – Uses – Over Extraction of Minerals and their Impact on Environment.

REFERENCE

1. Klee, G.A. 1991. Conservation of Natural Resources. Prentice Hall Publication.
2. Agarwal K.M. Sikdar. P.K.., S.C 2005. A Textbook of Environment, Macmillan India Limited.
3. Sharma, L.C 1998. Forest Economics and Management M/S Bishen Singh Mahendrapal Singh, Dehradun.
4. Santra C.S2005. Environmental Science, second Edition, New Central Book Agency (P) Ltd, London.
5. Freeman, A.M. 2001. Measures of value and Resources: Resources for the Future. Washington DC.

CORE PAPER - 7

ENVIRONMENTAL MICROBIOLOGY

UNIT I

History and Discovery of Microorganisms – Louis Pasteur's Contribution and Discoveries and Koch Postulates –Immunity – Various types- Chemotherapy – Mode of action of Chemotherapeutic agent.

Unit II

Prokaryotic and Eukaryotic cell, Structure of Bacteria – Structure- External to cellwall andInternal to cellwall, Virus.Growth and Reproduction of Bacteria and Virus, Bacteriophage.

Unit III

Sterilization – Physical and Chemical Methods.Culture Techniques – Types of Media, Micro Organism in Industry – Production of Lactic acid, Amino acid, Alcohol Fermentation Penicillin production.

Unit IV

Microorganisms in Soil, Air and Water – Rhizosphere and Non- Rhizosphere Microorganisms – Role of Microorganisms in Carbon, Nitrogen and Sulphur cycle.

Unit V

Microorganisms in Food: Milk, Fruits, Egg and Fish – Principles of Food spoilage and Food Preservation, Microorganisms in Sanitation.

REFERENCE

1. Micheal J. Pelczar, J.R.E.C.S. Chan Noel R. Krieg (1993) Microbiology, Tata McGraw Hill Edition, New Delhi.
2. Alexander, M (1961) Introduction to Soil Microbiology, John Wiley and Sons, Inc., New Delhi.
3. James M. Jaj (1986), Modern Food Microbiology, Third Edition , CBS Publishers
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5. Agricultural Microbiology, 1966. Rangaswami, Asia Publishing House, Bombay.

CORE PAPER - 8

ENVIRONMENTAL QUALITY AND POLLUTION MONITORING TECHNIQUES

UNIT I

Environmental Quality – Definition - Water Sampling-Collection of Water Samples-Handling and preservation-Devices -Methods for Sampling Particulates and Gaseous Emission-Measurement of Noise.

UNIT II

Physico-chemical and Bacteriological analysis of Water Quality: Physical Parameters – Colour – Temperature – Turbidity. Chemical Parameters-PH-Electrical Conductivity-Total Solids – Dissolved Oxygen-Total Alkalinity-Iron-Nitrate-Biochemical Oxygen Demand-Chemical Oxygen Demand. Biological Parameters – MPN (Most Probable Number) and MFT(Membrane Filter Techniques) - SPC(Standard Plate Count).

UNIT III

Collection of Soil Samples – Physico-Chemical Analysis of Soil -Density-Specific gravity-Texture-pH-Electrical conductivity-Chlorides-Nitrate-Phosphate-Organic matter.

UNIT IV

Environmental Standards-Ambient Air Quality Standards-Drinking Water Quality Standards-Effluent Standards for Land Disposal-Disposal on Inland Water-Noise Level Standards.

UNIT V

Instruments used for Pollution Monitoring-Colorimetric-pH meter-Electrical Conductivity Meter-Nephlometer-High Pressure Liquid Chromatography (HPLC)-X-ray Diffraction-Gas Chromatography with Mass Spectroscopy-Flame Absorption Spectrometry-Chemiluminiscence-Bioluminescence Test-Sound Level Meter.

REFERENCE

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2. Environmental Sampling Analysis: A Practical Guide, Xeith, L.H.,Boca Raton, F.L. 1991. Lewis Publication.
3. Standard Methods for the Examination of Water and Waste Water, 1998. 2nd Ed, APHA, Washington D.C.
4. Instrumental Methods of Chemical Analysis, 2001. B.K. Sharma, Goal Publishing House, Meerut.
5. Research Methodology – Methods and Techniques, 2nd Edition, C.R. Kothari and WishwaPrakasan New Delhi.

CORE PRACTICAL II

ENVIRONMENTAL CHEMISTRY AND COMPUTER SCIENCE

1. Estimation of Chlorophyll in normal and pollutant affected leaves.
2. Estimation of LC50 and LD50 with a heavy metal using a suitable organism.
3. Estimation of Afla toxin production.
4. Bio magnification of Pesticides.
5. Impacts of toxins on plants.
6. Biochemical effects of Lead and Cadmium.
7. Computing Mean, Median and Mode in MS-Excel.
8. Computing Mean Deviation and Standard Deviation using MS-Excel.
9. Creation of Pie Chart and Bar Chart in MS-Excel.
10. Sorting of Data in MS-Excel.
11. Creating, Editing and Formatting in MS-Word.
12. Creation of Slides in MS Power Point.

CORE PRACTICAL III

ENVIRONMENTAL MICROBIOLOGY AND POLLUTION MONITORING TECHNIQUES

1. Preparation of culture media for Microorganisms.
2. To show the presence of microorganisms around us.
3. Gram Staining of Bacteria.
4. Isolation of Microorganisms from the soil.
5. Observation of Root nodule Bacteria.
6. Isolation of Root nodule Bacteria.
7. Monitoring Principles.
8. Biosensors in Environmental monitoring.
9. Air sampling (HVAS) – Demonstration.
10. BOD Demonstration.
11. Estimation of total alkalinity in soil.
12. Estimation of Calcium and Magnesium in soil.

ALLIED – 2

PAPER – 4

ENVIRONMENT AND ECO-TOURISM

UNIT I

Scope and Definitions: Objectives of Tourism (geographical, social, economic, religious, cultural and environmental); Components of Tourism (information services, transport and accommodation).

Unit II

Concepts of Tourism – Classification - Religious Tourism – Cultural Tourism – Heritage Tourism – Monumental Tourism – Adventure Tourism – Mass Tourism - Consumptive & Non Consumptive Tourism – Benefits of Ecotourism – Trends affecting Ecotourism.

Unit III

Ecotourism – Definition and Characteristics Features (Ecosystem & Biodiversity), Goals (Social, economic and environmental): Criteria Conservation, Low Impact and Green Efforts, Sustainability, Recreation, Community Involvement and Environmental Education and Interpretation, Ecotourism in India.

Unit IV

Principles of Ecotourism – Sustainable Ecotourism – International Ecotourism – Ecotourism terms – Ecosystems – Eco travels – Eco park – Eco wonders – Eco Adventures/Activities – Eco tours – Eco places – Eco education – Concepts of Ecotourism – Objectives of Ecotourism

Unit V

Impact of Ecotourism- Economic Impacts (fiscalimpacts, concepts & methods) – Types and Degree of Impacts from Ecotourism Activities – Socio Cultural Impacts – Ecotourism related Organization – Ecotourism Research Disasters& Ecotourism. Eco Certification, Policies and Regulations – Ecotels & Ecomorals.

REFERENCE

1. Agarwal,A.N (1980) India Agriculture, Vikas publishing House, New Delhi.
2. Weaver, D.B (2001), The Encyclopedia of Ecotourism, Cabi, publishing , U.K.
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SKILL BASED SUBJECT
PAPER – 2
AQUACULTURE AND ENVIRONMENT

UNIT I

Culture System – Fresh Water – Brackish Water – Extensive - Intensive - Semi Intensive – Pokkali – Cage – Pen Culture – Mono – Monosex – Poly – Paddy cum Fish – Fish cum Poultry – Fish cum Dairy Fish cum Pig – Fish cum Duck – Fish Ponds – Breeding – Nursery – Rearing – Stocking – Dry and Wet Bunth – Construction and Maintenance of Fish Farm.

UNIT II

Induced Breeding – Hypophysation – Definition – Principles Hypophysation – Procedure of Hypophysation – Collection – Preparation – Injection – Mechanism of Pituitary Action – Advantages of Hypophysation – Seed Collection – Collection from Natural Habitat – Bundh Breeding – Hypophysation – Transport of Fish Seed – Open System – Closed System.

UNIT III

Preservation of Fishes – Fish Spoilage – Chemical Action – Autolysis – Microbial Action – Principles of Fish Preservation – Cleaning – Low Temperature – High Temperature – Dehydration – Salts – Methods of Preservation – Curing – Drying – Freezing – Fish diseases – White Spot Diseases – Costiasis – Whirling Diseases – Knot Diseases – Gill Rot – Pin Head – Rickets – Causes – Symptoms – Treatment.

UNIT IV

Ornamental Fish Culture – Aquarium – Aims of Aquarium – Requirements for an Aquarium – Types of Aquarium – Setting of Aquarium – Aquarium Fishes – Gold Fish – Angel Fish – Fighter Fish – Koi – Molly – Sword Tail – Zebra Fish – Guppy – Aquarium Plants – Fish Marketing – Definition – Marketing Channels – Types of Fish Marketing – Risks of Fish Marketing.

UNIT V

Aquatic Pollution – Definition – Pollutants – Marine Pollution – Causes – Ecological Effects – Effects of Aquatic Pollution on Fish – Water Quality Management – Physical – Chemical – Biological Parameters - Assessment of Water Quality – Weed Control – Harmful Effects of Weed Control – Aquatic Weeds – Control of Aquatic Weeds – Predators Control – Definition – Predatory Insects – Predatory Vertebrates.

REFERENCE

1. Jhingaran, C.G. 1981. Fish and Fisheries of India, Hindustan Publishing Corporation.
2. Pillay, T.V.R. 1990. Aquaculture. Principles and Practices. Blackwell Publishing, Oxford.
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5. N. Arumugam. 2008. Aquaculture, Saras Publications, Nagercoil, Tamilnadu.

NON-MAJOR ELECTIVE

PAPER - 2

OCCUPATIONAL SAFETY HEALTH AND MANAGEMENT

UNIT I

Occupational Hazards- Types of Occupational Hazards – Health – Definition – Need for Good Health – Factors Affecting Health – Malnutrition – Deficiency Diseases-Balanced diet-Food adulterants-Personal Hygiene.

UNIT II

Health problems due to Air and Water Pollution - Communicable Disease - Mode of transmission (Epidemic and Endemic diseases)-Water borne - Air borne - Food borne Diseases.

UNIT III

Occupational health hazards-Physical-Chemical and Biological hazards-Occupational diseases –Silicosis-Asbestosis-Byssinosis-Hearing loss-Prevention and Control of Occupational diseases.

UNIT IV

Industrial safety standards- Causes of Accidents-Definition-Accident Reporting System-First aid-Frequency rate-Prevention and Control-Health education-Safety awareness.

UNIT V

Environmental Management System (EMS)-ISO14000 and ISO14001-OSHA-The Public Liability Insurance Rules, 1991. Compensation Act.

REFERENCE

1. Scoot, R, M, 1997 concepts of industrial hygine, lewis publisher, New York.
2. Diberardins L.J., 1998. Hand Book of Occupational safety and health, john Willey, New York.
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5. Gurjar, B.R., Molina, L.T. & Ojha C.S.P. 2010. Air Pollution: Health and Environmental Impacts. CRC Press, Taylor & Francis.

SEMESTER V

CORE PAPER – 9

ENVIRONMENTAL LAWS, POLICIES AND TREATIES

UNIT I

Constitution of India-Fundamental Rights – Evolution and Development of Environmental Law with reference to Stockholm Conference 1972 – Environmental Legislation – Legal Definition – Article48A – Article51A – National Green Tribunal – Environmental Ethics –Principle – Importance.

UNIT II

Legislation for Environmental Protection-The Water(Prevention and Control of Pollution) Act, 1974-The Air(Prevention and Control of Pollution) Act,1981-The Environment(Protection)Act, 1986 –The Forests(Conservation) Act,1980- The Noise pollution (Regulation and Control) Rules 2000.

UNIT III

The Wildlife (Protection) Act, 1972-The Biological Diversity Act, 2002- The Public Liability Insurance Act, 1991- The National Green Tribunal Act, 2010-Solid Waste (Management and Handling) Rules 2000 – Biomedical Waste (Management and Handling) Rules 1998.

UNIT IV

Environmental Policy- Definition – Benefits of Developing an Environmental Policy - International Agreements-Montreal Protocol 1987- Kyoto Protocol 1997- Copenhagen - Paris Summits Convention on Climate Change-Carbon Credit and Carbon Trading.The National Forest Policy, 1988- Policy Statement for the Abatement of Pollution 1992.

Unit V

Environmental Treaties – Nairobi Declaration-United Nations Conference on Environment and Development 1992 – Rio-de-Janerio(Rio Declaration, Agenda21) Scheme and Labelling of Environment Friendly Products –Ecomarks– Indus Water Treaty – Ganges Water Treaty - Nation River Linking Plan-Vienna Convention for the Protection of Ozone Layer 1985.

REFERENCE

1. Abraham, C.M. 1999. Environmental Jurisprudence in India. Kluwer Law International.
2. Agarwal, V.K. 2005. Environmental Laws in India: Challenges for Enforcement. Bulletin of the National Institute of Ecology7-238.
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CORE PAPER – 10

ENVIRONMENTAL POLLUTION AND MANAGEMENT

UNIT I

Water pollution – Definition – Physical – Chemical and Biological properties of waste water – Water pollutants – Causes and Effects of Water Pollution – Eutrophication - Drinking Water Quality Standards – Waste Water Treatment – Primary – Secondary – Tertiary – Water Pollution Prevention and Control Act – 1974 – Pollution in River Ganga.

UNIT II

Air pollution – Natural and Anthropogenic Sources of Pollution – Primary Pollutants – CO, Sulphur dioxide ,Lead, Aerosols ,Hydrocarbon – Secondary Air Pollutants – PAN, Ozone – Effects of Air Pollution on Human Health – Vehicular pollution – Acid rain – GreenhouseEffect – Global Warming – Ozone Depletion.

UNIT III

Prevention and Control of Air Pollution particulate Control – Settling Chamber, Scrubber, Bag Filter, Cyclones, Electrostatic Precipitators – Gaseous Emission Control Methods – Air Pollution Prevention and Control Act1981 – Case studies – Bhopal episode – London smog – Stone leprosy in TajMahal.

UNIT IV

Soil pollution – Soil pollutants – Biodegradable – Non-biodegradable – Sources of soil pollution – Impact of soil pollution – Noise pollution – Sources – Types of Noise – Automobile noise – Industrial noise – Domestic noise- Effects of noise pollution on Human health –Noise exposure levels and standards – Noise Control and Abatement.

UNIT V

Government agencies and programmes –The Tiwari Committee – Creation of NCEPC – DOE-Department of Environment and forest – CPCB-Central Pollution Control Board – SPCB-State Pollution Control Board – Creating Public Awareness – Functions of State Pollution and Central Pollution Control Board.

REFERENCE

1. Rao, M.N and H.V.N. Rao. 1993. Air pollution, Tata McGraw – Hill publishing Company Limited. New Delhi.
2. Kudesia, V.P and RituKudesia. 1992. Water Pollution, PragatiPrakashan Publication, Meerut.
3. Sawyer, C.N., P.L McCarty and G.F. Perlin. 1994. Chemistry of Environmental Engineers, McGraw-Hill.
4. Sharma, B.K and H. Kaur. 1994. Soil and Noise Pollution. Goel Publishing House Meerut.
5. Abbasi. S.A. 1998. Environmental Pollution and its Control, Congent Publications (P) Limited, New Delhi.

CORE PAPER – 11

ENVIRONMENTAL IMPACT ASSESSMENT

UNIT-I

EIA-Introduction-Concept of EIA-Scope and objectives of EIA –EMP-Historical perspectives of EIA-Organization responsible for EIA-Pre-project analysis-Site selection and Area classification-Sitting and Setting criteria for EIA projects.

UNIT-II

Environmental Indicators - Abiotic and Biotic factors- Socio and Economic aspects-Environmental quality-Air, Water, Soil, Flora and Fauna-Field survey and data collection-Environmental auditing.

UNIT-III

Various steps of EIA-Content of EIA-Analytical and integrated approach assessment methodology-Adhoc, Overlay network, Matrix and Checklist-Environmental values and Technique-Cost benefit analysis-Case studies Hydroelectric project, mining, Power plant, Roads and airport.

UNIT-IV

Environmental impact Assessment Notification (1994) Procedure for Environmental clearance-List of the project required, Environmental clearance, Composition of Expert Committe- Procedure for public hearing-Project clearance.

UNIT-V

Coastal Regulation Notification (1991)-Prohibitory activities, permissible activities – Coastal area classification, List of products permitted for storage Port area, Composition of coastal zonal committee.

REFERENCE

1. Barrow, C.J. 2000. Social Impact Assessment: An Introduction. Oxford University Press.
2. Glasson, J., The rivel, R., Chadwick, A. 1994. Introduction to Environmental Impact Assessment.
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3. Judith, P. 1999. Handbook of Environmental Impact Assessment. Blackwell Science.
4. Marriott, B. 1997. Environmental Impact Assessment: A Practical Guide. McGraw-Hill, New York, USA.
5. Canter, L.W. 1997. Environmental Impact Assessment. McGraw-Hill, New York.

ELECTIVE

PAPER – 1

PRINCIPLES OF SUSTAINABLE DEVELOPMENT AND MANAGEMENT

UNIT – I

Function of Management – Planning Organizing and Controlling, Systems approach to Management, Patterns of Analysis, Economic, Social Political and Ethical factors affecting Management practice.

Unit – II

Steps in the Planning Process Management.By objectives, Programme Budgeting, Capital budgeting, Economic Analysis – Marginal Analysis, Benefit / Cost Analysis etc. Decision Analysis – Risk and Uncertainty decision tress, Strategy and Policy Analysis, Limitation of Planning.

Unit – III

Organizational Structure, Formal and Informal Organization, Line and Staff relations, relations with the public , Principles of delegation, Performance appraisal motivation, Communication and leadership aspect, Theories of Organization.

Unit – IV

Green buildings – History of Green buildings – Need and Relevance of Green buildings – Associated cost and benefits –Outlined examples of Green buildings – LEED certified building - Eco mark certification – Establishment of Eco mark in India, Its importance and implementation.

Unit – V

Public transportation for Sustainable development – Green belts – Introduction to UNEP's – Green Economy Initiative, inclusive Economic growth of the society – REDD+ initiative and cap and trade concept – Green banking – Setting environmental goals, resource mobilization use of Natural resource and Environmental indicators, Output budgeting, Monitoring and Evaluating Environmental Programme.

REFERENCE

1. Sharma ,R.D.(1976), Organizational Management, Light and life publishers, New Delhi
2. Chakraborthy. S.K (1976) Management by objection Macmillan Co .of India Ltd, New Delhi
3. Varma and Agarwal, theory & practice of Management Forward Book Depot, New Delhi.
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5. Arceivala, S.L. 2014. Green Technologies: For a Better Future. Mc-Graw Hill Publications.

SKILL BASED SUBJECT

PAPER – 3

FOREST CONSERVATION AND MANAGEMENT

UNIT I

Forest-Types-Moist Deciduous-Dry Deciduous-Evergreen – Semi green-Grassland- Thorny Forest - mangrove forest -utilization of forest products-Timber, firewood, pulp, fodder and medicinal plants.

UNIT II

Sacred groves-Values- Scared groves in Tamil Nadu - Shrines of symbols-Character of deities-festivals-Beliefs, Taboos associated with sacred groves-key stone species-ethical dilemma in sacred groves-conservation.

UNIT III

Forest movement-and Peoples participation - Tribal community symbiotic relationship between tribal and Forest, community participation - Chipko movement, Apiko movement. India`s bishnoi community and their conservation practices.

UNIT IV

Social forestry, Afforestation, Ecological significance of Forests, plant indicators, Forests as carbon sinks.

UNIT V

Forest conservation-Protection from fire, Prevention of Fire, Protection from wild animals-Raise ofawareness, through tourism, Role of government in forest conservation, Forest conservation ACT 1980.

REFERENCE

1. Kormondy, E.J. 2005. Concepts of Ecology. Prentice hall of India Pvt Ltd. New Delhi
2. Calrke, G.L.1954. Elements ecology , John Wiley and Sons, New York.
3. Champman, R.N.1928. The Quantitative analysis of environmental factors Ecology 9:111-122
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SEMESTER VI

CORE PAPER 12

CONSERVATION BIOLOGY AND MANAGEMENT

UNIT I

Bio diversity-Types-Genetic Diversity-Species Diversity-Ecosystem Diversity-Values of Bio diversity-Consumptive, Productive, Social, Scientific and Aesthetic values - Hot spots of Bio diversity-Threats to Bio diversity-Habitat Loss-Over exploitation-Poaching-Fire-Deforestation-Pollution-Illegal Trade.

UNIT II

Bio diversity Conservation-In situ conservation-Wild life Sanctuaries Mudumalai – Kalakad - Point Calimere -Vedanthangal - National Parks – Guindy - Silent Valley- Kaziranga -Biosphere Resources - Nilgiri - Gulf of Mannar - Nandadevi.

UNIT III

Ex situ Conservation- Botanical Gardens-Zoos-Gene Bank – Seed Bank, Arboreta-Germplasm Bank-Plant Cell Bank-Special Projects for Conservation-Project Tiger- GIR Lion Project-Crocodile Project.

UNIT IV

Wild life Protection Act 1972-Wild life Protection Amendment Act 2002-Forest Management-Afforestation - Social Forestry- Chipko Movement-IUCN Threatened Species-Red Data Book –Endangered-Extinct-Bio diversity Act 2002

UNIT V

Role of Government and Non-Governmental Organization in Conservation of Bio diversity – MOEF - Ministry of Environment and Forest. BNHS- Bombay Natural History and Society-IUCN International Union for Conservation of Nature and Natural resources-WWF-World Wild Fund for nature-CITES- Conservation on Trade in Endangered species of Wild life Fauna-Role of Media in Conservation of Biodiversity.

REFERENCE

1. Krishnamurthy, K.V. 2004. An Advanced Text Book of Biodiversity - Principles and Practices. Oxford and IBH Publications Co. Pvt. Ltd. New Delhi.
2. Pandit, M.K. &Grumbine R.E. 2012. Ongoing and proposed hydropower development in the Himalaya and its impact on terrestrial biodiversity. Conservation Biology.
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CORE PAPER 13

NATURAL HAZARD AND DIASTER MANAGEMENT

UNIT I

Definition of Hazard, Natural, Technological Hazard-Concept of Risk and Vulnerability- Reasons of Vulnerability –Rapid Population growth-Urban Expansion-Environmental Pollution-Epidemics-Industrial Accidents-Two components of Risk: Likelihood and Consequences, Qualitative Likelihood Measurement Index (LMI): Categories of (direct losses, indirect losses, tangible losses and intangible losses) Application of Geo informatics in Hazard, risk and Vulnerability Assessment.

UNIT II

Natural Hazard-Types of Natural Hazard- Hydrological-Atmospheric-Geological Hazard-Earthquake- Causes, Impacts on Environment-Control Measures-Tsunami- Cyclones – Landslides – Causes, Impacts on Environment- Preventive Measures

UNIT III

Anthropogenic Hazards: Impacts of Anthropogenic Activities-Rapid Urbanisation - injudious Ground Water Extraction-Sand Mining from River bank-Deforestation-Mangroves Destruction-Warfare-Chemical Weapons-Biological Weapons-Major Accidents from Industries-eg: Bhopal Diaster-Iov canal Disaster-London Smog.

UNIT IV

Emergency Management of Disaster-Phases and Professional Activities-Mitigation-Preparedness-Response-Recovery-Phases-Personal activities-Mitigation-Structural mitigation-Nonstructural mitigation-Preparedness-Response-Recovery as a Profession-Immediate steps to be taken after a Disaster.

UNIT V

Medical Management of Disaster-Disaster Impacts and Response-Identification of Dead-Search Rescue-First aid-Relief phase-Vaccination, Basic sanitation and Personal hygiene-Environmental disaster-Assessment-Planning-Resettlement-Rehabilitation-Role of NGO’s, GO’s(relief camp-physiotherapy-simplified yoga and meditation-stress management).

REFERENCE

1. Coppola D. P. 2007. Introduction to International Disaster Management. Butterworth Heinemann.
2. Cutter, S.L. 2012. Hazards Vulnerability and Environmental Justice. EarthScan, Routledge Press.
3. Keller, E. A. 1996. Introduction to Environmental Geology. Prentice Hall, Upper Saddle River, New Jersey.
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CORE PAPER 14

ENVIRONMENTAL SAFETY HEALTH AND MANAGEMENT

UNIT-I

Environmental Health-Concept and Scope-Need for good health-Factors affecting health-Malnutrition-Deficiency diseases-Kwashiorkor- Marasmus -Balanced diet-Food adulterants.

UNIT-II

Public Health-Communicable diseases – Mode of transmission (Epidemic and Endemic diseases) Bacterial diseases – Tuberculosis – Typhoid- Filariasis -Viral diseases-Hepatitis – AIDS – Rabies – Waterborne and Airborne diseases.

UNIT-III

Occupational Health Hazard-Concepts and Scope - Occupational hazard - Physical-Chemical and Biological hazards - Occupational diseases - Pneumoconiosis-Silicosis-Anthracosis – Byssinosis - Farmer's lungs-Lead poisoning-Skin diseases-Prevention and Control of occupational diseases.

UNIT-IV

Industrial Safety and Management Techniques – Accidents – Causes - First aid - Prevention and Control - Risk analysis and assessment - Health education - Safety measures in Industry.

UNIT-V

Environmental Management System (EMS) – ISO 14000 and ISO 14001-Compensation Act-Public Liability Insurance Act - Health Organization - NIOH (National Institute of Occupational Health) AIHPH (All India Institute of Hygiene and Public Health) NHO (National Health Organization) WTO (World Trade Organization) OSHA (Occupational Safety and Health Administration) - Standards.

REFERENCE

1. Scoot, R, M, 1997 concepts of industrial hygine, lewis publisher, New York.
2. Diberardins L.J., 1998. Hand Book of Occupational safety and health, john Willey, New York.
3. Park J.E, and Park Preventive and social medicine.
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CORE PRACTICAL IV

POLLUTION MANAGEMENT

ANALYSIS OF WATER SAMPLES IN POLLUTED AND NON-POLLUTED WATER

1. Estimation of Total solids.
2. Estimation of Total Dissolved solids.
3. Estimation of Turbidity.
4. Estimation of pH.
5. Estimation of Chloride.
6. Estimation of Dissolved Oxygen.
7. Estimation of Total Alkalinity.
8. Estimation of Total Hardness.
9. Estimation of Phosphate.
10. Pollution Indicators.
11. Demonstration of AAS.
12. Demonstration of Noise Level Meter.

SKILL BASED SUBJECT
PAPER – 4
ENVIRONMENTAL BIOTECHNOLOGY AND HERBAL SCIENCE

UNIT I

Environmental Biotechnology: Basic Concept, Aim and Scope – Pollution Monitoring – Biotechnological Methods – Biosensors – Biological Treatment of Waste Water.

UNIT II

Agricultural Biotechnology – Micro Propagation – Techniques – Application – Bio Fertilizers – Mass Cultivation Techniques of Rhizobium, Azolla and Phospho bacteria – Bio-Pesticides – Petroleum Plants.

UNIT III

Mushrooms Technology – Nutritive Value of Edible Mushrooms – Medicinal Value of Mushrooms – Advantages of Mushrooms Cultivation – Cultivation of Oyster Mushrooms.

UNIT IV

Herbal Science – Traditional System of Medicine – Siddha – Ayurveda – Homeopathy – Common Medicinal Plants – Zingiber officinale– Aloe vera – Ocimum sanctum – Asafoetida – Honey.

UNIT V

Conservation Methods for Herbal Plants – Insitu and Ex-situ Conservation – Herbal Farms – Biotechnology in Conservation of Medicinal Plants – Adulteration of Herbal Products – Reason – Types – Disadvantages.

REFERENCE

1. N. Arumugam, V. Kumaresan, Applied Plant Biotechnoloy. 2016, Saras Publication, Nagarcoil.
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