THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

DEGREE COURSE

B.Sc. ENVIRONMENTAL MANAGEMENT

UNDER CBCS

(with effect from 2008-2009)

The Course of Study and the Scheme of Examinations

Year/ Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs/ Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
I Year I Semester	I	Language	Paper I		6	3	3	25	75	100
	II	English	Paper I		6	3	3	25	75	100
	III	Core	Paper I	Fundamentals of Earth Science	6	3	3	25	75	100
	III	Core Practical		Earth Science	3	-	-	-	-	-
	III	Allied I	Paper I	Environmental Zoology	4	4	3	25	75	100
	III	Allied Practical		Environmental Zoology	3	-	-	-	-	-
	IV			**Environmental Studies**	2	2	3	25	75	100
I Year II Semester	I	Language	Paper II		6	3	3	25	75	100
	II	English	Paper II		6	3	3	25	75	100
	III	Core	Paper II	Environmental Ecology	5	3	3	25	75	100
	III	Core Practical	Practical I	Earth Science and Environmental Ecology	4	6	4	40	60	100
	III	Allied I	Paper II	Environmental Botany	4	4	3	25	75	100
	III	Allied Practical	Practical I	Environmental Zoology & Environmental Botany	3	2	3	40	60	100
	IV			**Value Education**	2	2	2	-	50	50
II Year III Semester	III	Core	Paper III	Environmental Chemistry	5	3	3	25	75	100
	III	Core	Paper IV	Environmental Geography	5	3	3	25	75	100
	III	Core	Paper V	Computer Applications and Bio-statistics in Environmental Science	4	3	3	25	75	100

Year / Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs / Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
	III	Core Practical	-	Environmental Chemistry and Computer Science	4	-	-	-	-	-
	III	Allied II	Paper III	Environmental Economics	7	5	3	25	75	100
	IV	Skill Based Subject I	Paper I	Aquaculture	3	3	3	25	75	100
		Non-Major Elective I	Paper I	Global Warming and Climate Change	2	2	3	25	75	100
II Year IV Semester	III	Core	Paper VI	Environmental Toxicology	5	3	3	25	75	100
	III	Core	Paper VII	Environmental Microbiology	5	3	3	25	75	100
	III	Core	Paper VIII	Natural Resources & Management	4	3	3	25	75	100
	III	Core Practical	Practical II	Environmental Chemistry and Computer Science	-	4		40	60	100
	III	Core Practical	Practical III	Environmental Toxicology and Microbiology	4	3	3	25	75	100
	III	Allied II	Paper IV	Environmental Eco-tourism	7	5	3	25	75	100
	IV	Skill Based Subject II	Paper II	Solid waste management & vermitech	3	3	3	25	75	100
		Non-Major Elective II	Paper II	Environmental Safety, Health and Management	2	2	3	25	75	100
III Year V Semester	III	Core	Paper IX	Methodologies in Environmental Analysis	5	5	3	25	75	100
	III	Core	Paper X	Environmental Pollution and Management	5	5	3	25	75	100
	III	Core	Paper XI	Principles of Management	5	5	3	25	75	100
	III	Core Practical	-	Methodologies in Environmental Analysis & Management	6	-	-	-	-	-
	III	Elective I	Paper I	Environmental Impact Assessment	6	5	3	25	75	100
	IV	Skill Based Subject III	Paper III	Forest Conservation & Management	3	3	3	25	75	100

Year / Semester	Part	Subject	Paper	Title of the Paper	Ins. Hrs / Week	Credit	Exam Hrs	Max. Marks		
								IA	Uni. Exam.	Total
III Year VI Semester	III	Core	Paper XII	Conservation Biology and Management	4	5	3	25	75	100
	III	Core	Paper XIII	Disaster Management	4	4	3	25	75	100
	III	Core	Paper XIV	Environmental Safety, Health and Management	4	4	3	25	75	100
	III	Core Practical	Practical IV	Methodologies in Environmental Analysis & Management	-	8	3	40	60	100
	III	Core	Paper XX	Project *	15	10	-	50	150	200
	IV	Skill Based Subject IV	Paper IV	Medical Zoology	3	3	3	25	75	100
	V	Extension Activities				1	-	-	-	50
				Total	**180**	**140**				**3800**

THIRUVALLUVAR UNIVERSITY

B.Sc. ENVIRONMENTAL MANAGEMENT

SYLLABUS

UNDER CBCS

(with effect from 2008-2009)

I SEMESTER

PAPER I

FUNDAMENTALS OF EARTH SCIENCE

UNIT-I

Earth - Its interior and surface: The Universe - Big Bang theory - Meteors - The origin, shape and size of the earth - The solar system - Planets - Eclipses - Solar, Lunar - Rotation and Revolution of the earth - Seasons - Latitude and Longitude - Layers of the earth - Sial, Sima, Nife - History of the Earth's surface - Precambrian, Paleozoic, Mesozoic, Neozoic and Quaternary era.

UNIT-II

Earth's Crust: Formation of Rocks - Igneous rocks: Intrusive and Extrusive; Plutonic rocks - Dyke rocks: Acid and Basic rocks - Sedimentary rocks: Inorganic and Organic - Sand stones, clay shales, gravels, pebbles, breccias - Metamorphic rocks - Regional and contact metamorphism.

UNIT-III

Major land forms and their transformation: Theories and stages of mountain building - Classification of mountains - Types of Plateaus : Intermontane, Piedmont, Continental - Hill lands - Plains - Classification - coastal - Destructional and Depositional plains.

UNIT-IV

Denudation and its agents: Weathering - Mechanical and chemical - Agents of weathering - Insolation, frost, plants, winds and gases. Agents of Denudation: Running water, Underground water, moving ice, wind, waves and breakers.

UNIT-V

Soil and its types: Composition, formation and types of soils - Origin of the soil- Texture of the soil - Soil horizons and profiles - Soils of the world: Laterites, Red soil, Black cotton soil, Podsols, Praire soils, Chestnut soils - Laterisation.

Reference

1. Das Gupta, A and A. N. Kapoor (Eds) (1999) Principles of Physical Geography.

   Twentieth edition. S. Chand and Co ltd., New Delhi.

2. Keller, E. A. (2005) Introduction to Environmental Geology. Prentice Hall Pub., NY.
3. De Blij, H. J., and Peter O. Muller (1993) Physical Geography of the Environment.

   John Willey and sons, Inc. Brisbane.

4. Strahler and Strahler (1970) Environmental Geology. Willey and Sons, NY.

ALLIED I

PAPER I

ENVIRONMENTAL ZOOLOGY

UNIT-I

Classification of Animals - Practical, artificial Natural system of classification - Binomial nomenclature - Modern classification of living organisms - Branches of science related to zoology - Discoverers.

UNIT-II

Physiology - definition - brief history - fields of Physiology - Branches of Physiology - embryology - Program of development - Historical thoughts - Concepts - Branches of embryology - Scope of Embryology Branches of Genetics.

UNIT-III

Definition - History - Vapour theory - fluid theory - epigenic theory - particulate theory - Performation theory - Pangenic theory - germ plasm theory.

UNIT-IV

Animal distribution - Classification of animal distribution - Patterns of distribution - Composition distribution - discontinuous distribution - Bipolar distribution - isolation distribution, factors affecting distribution.

UNIT-V

Economic zoology - Economic importance of protozoans in relation to health. Helminth parasites and diseases. Productive insects - Honey bee - silk worm - Lac insects.

Reference

1. Sharma S. K. and S. K. Sharma (2002) Tips on Zoology - Krishna Prakashan Media (p) Ltd.
2. Verma, P. S., V.K. Agarwal and B.S. Tyagi (2002) Animal Physiology and Ecology, - S. Chand and Company, New Delhi.
3. Meyyan, R. P. (1988) Genetics, Saras publications.
4. Jayaraj, (1988) Fundamentals of Ecology - Veer Bala Rastogi,. S. Chand and Company, New Delhi.

II SEMESTER

PAPER II

ENVIRONMENTAL ECOLOGY

UNIT-I

Importance and Scope of Ecology - Environmental factors - Climate - Temperature - Light - Humidity - Edaphic and Biotic factors.

UNIT-II

Habitat and ecological niche: Study of pond, grass - land, forest, mangrove ecosystem - concept of energy, food chain, food web and ecological pyramids.

UNIT-III

Population ecology: Basic concept of population - Natality, Mortality - Age distribution - Survivorship curves - Ecotone and edge effect.

UNIT-IV

Community ecology: Definition - Ecological dominance, Ecotone - Edge Effect, Ecological equivalents, indicators, succession and climax.

UNIT-V

Animal Association - Interspecific interactions and Intraspecific interactions - Symbiosis, Mutualism, Antagonism, Commensalism, Predation and Parasitic relationships.

Reference

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

ALLIED I

PAPER II

ENVIRONMENTAL BOTANY

UNIT-I

Fundamentals of classification. Basic unit of classification - Classification of Plants - Taxonomic hierarchy - Artificial and Natural classification.

UNIT-II

Diversity of plant species - Trees, shrubs, herbs, grasses - halophytes, hydrophytes, mesophytes and xerophytes.

UNIT-III

Anatomy: Dicot - stem, root, monocot - stem, leaf. Vegetation (forest types): Moist deciduous, dry deciduous, ever green, semi-evergreen, grassland, thorn forest, mangroves.

UNIT-IV

Mendalism - Monohybrid and dihybrid cross, Origin of life - Theories of Evolution. Lamarck, Charles Darwin and De - vries.

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 I &II, McGraw Hill,. New York,
3. Verma, P.S. and V.K. Agarwal, (1989) Principals 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, M.C.Graw Hill Publications.
6. Mitra, S. (1994) Genetics - A Blue Print of life. Tata McGraw **Hill**

PRACTICAL I

EARTH SCIENCE AND ENVIRONMENTAL ECOLOGY

1. Identification of type 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. Diagrammatic representation of solar, lunar eclipses, day and night.
5. Identification of coal fields - Economic aspects, availability of coal or
   Usage of topographic maps - to study about land forms
6. Submission of 10 herbarium sheets with proper field note book for practical examination
7. Study of vegetation by chart Quadrat, Frequency and Relative Frequency methods.
8. Estimation of species diversity by Shannon - Weiner diversity index method.
9. Squash preparation of onion root tip.
10. Separation of plant pigments by paper chromatography.

ALLIED PRACTICAL

ENVIRONMENTAL BOTANY

11. Plants as Pollution Indicators: At least 2 examples of Museum specimen or fresh sample.
12. Study on the morphology and anatomy of hydrophytes - Leaf, stem and petiole.
13. Study on the morphology and anatomy of xerophytes - Leaf and stem.
14. Study on the morphology and anatomy of mesophytes - Leaf and stem.
15. Study on the morphology of halophytes - fresh samples or Museum specimens.
16. Demonstration of Microscope.
17. Identification and salient features of animals available (Prepared slides or Museum specimens)
18. Identification of Mendelian population - dominant - recessive by P.T.C. test.
19. Submission of Economically important insects available (charts) in your habitat.
20. Qualitative and quantitative analysis of zooplankton.

III SEMESTER

PAPER III

ENVIRONMENTAL CHEMISTRY

UNIT-I

Fundamental concepts in chemistry – Elements and compounds – Atomic structure – Formation of molecules – Solutions: normality, molality and molarity - Ionization – radicals – Expressing concentrations.

UNIT-II

Properties of water – Hydrogen Bonding – covalent bonding – ionic bonding – Water quality parameters: physical & Chemical.

UNIT-III

Composition and structure of the atmosphere – Meteorological Parameters – humidity, wind direction and speed – temperature inversion – Green House Gases and Global Warming – Acid rain.

UNIT-IV

Nature of soil – Soil macro and micro nutrients – Soil structure and texture – Soil water – Soil air – Soil Temperature – Soil organic matter.

UNIT-V

Basic principle of Instrumentation and application of spectrophotometer – photometric laws – application of pH, conductivity meter.and turbidity meter.

References:

1. Puri. B. R, L. R. Sharma and M .S. Pathima. (2004) Physical Chemistry, Vistal pub and co, Jalandar.
2. De, A. K. (2003) Environmental Sciences, Wilkey Eastern Hd, New Delhi.

3. Sharma. B. K. (1990) Instrumental Methods of Chemical Analysis, Geol pub House, Meerut.
4. Bhatia. S. C. (2002) Environmental Chemistry, CBS Publishers and Distributors, New Delhi.
5. The text book of soil science – Dhaji.
6. Basic Environmental Technology - Nathansan

PAPER IV

ENVIRONMENTAL GEOGRAPHY

UNIT – I

Continents and oceans – Landmasses Temperature of the Atmosphere-Insolation – heating of the atmosphere – Horizontal distribution of temperature and pressure - Elnino phenomenon.

UNIT – II

Hydrosphere - Movements of ocean - waves, currents, tides, drifts and creep. Lithosphere - layers of earth - Minerals and rocks - types of rock.

UNIT – III

Volcanoes - Types of volcanoes – volcanoes and landscape - Distribution of volcanoes. Earth quakes - Origin - Causes & types of earthquakes.

UNIT – IV

Variable winds - cyclones and anticyclones - Size & shape – velocity & speed. Moisture in the atmosphere – Humidity - Evaporation - Clouds - Types of rainfall.

UNIT – V

Biosphere - Climate, soil, plants and animals. Biomes – principal terrestrial biomes. Zoogeography beginning zoogeography and it realms.

REFERENCES

1. Edward A. Keller, (1981) Environmental Geology, 3rd Edition. Charles E. Merill Pub. Co. Ohio.
2. Strahler and Strahler (1970) Environmental Geology. Willey and Sons, NY.
3. De Blij, H. J., and Peter O. Muller, (1993) Physical Geography of the Environment. John Willey and sons, Inc. Brisbane.
4. Das Gupta, A., and Kapoor, A. N. (1986) Principles of Physical Geography. S. Chand and Company.

PAPER V

COMPUTER APPLICATIONS AND BIOSTATISTICS IN ENVIRONMENTAL SCIENCES

UNIT-I

Data –methods of Collection. Tabulation –types of tables. Diagrammatic and graphical representation.

UNIT-II

Measures of central tendency-Calculation of Mean, Median and Mode, Moments

Skewness and Kurtosis

UNIT-III

Measures of dispersion- range and deviations, Mean deviation, Standard deviation and standard error.

UNIT-IV

Introduction and basic concepts of computer, Parts of computer, types of Computer Number system, Computer organization, software, computer virus, C-language and its applications.

UNIT-V

Basic principles of a digital computer (Elementary knowledge – input – central processing unit – output– peripherals). Compression of hardware and software. Computer operating systems – WINDOWS - MS Word, Excel – Internet, World Wide Web, Search Engines, E-Mail.

REFERENCES

1. Palanisamy, M (1989) A Text Book of Statistics, Paramount Publication, Palani
2. Vittal, R.R (1986) Business Mathematics and Statistics, Murugan Publications
3. Gupta, S.P. (1996) Statistical Methods, Sulthan chand and Sons Publications, New Delhi
4. Byron S Gottfried (1996) Programming with C, Hill Publishing Co, New Delhi
5. Sanjay Saxena (2003) A First course in computers, Vikas publishing house Pvt. Ltd, New Delhi

CORE PRACTICAL II

ENVIRONMENTAL CHEMISTRY AND COMPUTER SCIENCES

1. Calculation of Oxidation number of Cr in K2Cr2O7, Mn in KMnO4 ,
2. Standardization of pH with buffer solutions (4, 7 and 9).
3. Measurement of pH of acidic and basic solution using pH meter
4. Volumetric titration – Strong acid vs Strong base. Calculation of end point using V1N1=V2N2.
5. Conductometric titration – Strong acid vs Strong base. Calculation of end point using graph.
6. Graphical representation of data
7. Computation of mean, mode, median, standard deviation.
   (Using softwares – Excel, SYSTAT)

ALLIED II

PAPER III

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

Resource 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

Environment and Sustainable Development: Environmental Costs of Economics Growth – Limits to Growth – Sustainable Development – Brundtland Commission – Sustainable Industrialization – Pollution Abatement and Control.

UNIT-V

Pollution Control: Basic Approach to Environmental Policy – Problem of pollution Control – Moral suasion – Direct control – Regulation – Prohibition – Pollution Tax – Effluent Charges and Subsidies – Common Effluent Treatment Plant.

REFERENCES

1. Nick Hanley, Jainson F. Shorgen and Ben White (1999) Environmental Economics – In Theory and Practice. Macmillan India Ltd, New Delhi.
2. Roger Perman, Yue Ma and James Mc Gilvray (1997) Natural Resources and Environmental Economics. II Edition. Addison Weley Longman Ltd, Singapore.
3. John Bowers (1997) Sustainability and Environmental Economics, Addison Weley Longman Ltd, Singapore.
4. David W. Pearce and Kerry R. Turner (1999) Economics of Natural Resources and The Environment. The Johns Hopkins University Press, Baltimore.
5. Uberoi, N. K. (2004) Environmental Management. Excel Book, New Delhi.
6. Kerry R. Turner, David W. Pearce and Ian Bateman (1993) Environmental Economics – An Elementary Introduction. The Johns Hopkins University Press, Baltimore.

SKILL BASED SUBJECT I

PAPER I

AQUACULTURE

UNIT-

Fish culture: Cultivable fresh water fishes--Culture Pond-Pond construction and management: Selection of site-soil quality-layout-inlet-outlet-dykes-

Water quality Management- Fertilizing-Eradication of predators-weeds

UNIT-II

Induced breeding-Seed -Procurement-Collection and Transport of seeds and breeders

Types of hatcheries

UNIT-III

Economic importance of fishes- Nutritive value of fish-Crafts and gears

UNIT-IV

Fish diseases: symptoms-treatment-prevention-Preservation and Processing of fish: Methods of preservation processing-Refrigeration, Deep freezing, Salting, Drying, Smoking, Canning, pickling

Causes for fish spoilage-Rigor mortis

UNIT-V

Aquarium and Ornamental fishes-Aquarium tanks-maintenance-ornamental fishes

References

Jhingaran, C.G.1981. Fish and Fisheries of India, Hindustan Publishing corporation. Delhi.

Novikov, V.M. Handbook of Fishery Technology. Vol I American Publishing co

Pillay,T.V.R. 1990. Aquaculture. Principles and Practices. Blackwell Publishing.Oxford.pp575.

Rath, R.K. Freshwater aquaculture-Scientific Publishers

Samuel,C.T. 1968.Marine Fisheries in India.S.T.Reddiar and Sons. Pp254.

Santhanam, R.1990. Fisheries Science.Daya Publishing House,Newdelhi.

Srinivasulu reddy,M and K.R.S Sambasiva Rao. 2004.A text book of Aquaculture. Discovery Publishing House,NewDelhi.

Talwar,P.K. and Jhingaran,A.G. 1991. Inland fishes of India and adjacent countries. Vols.I &II. Oxford and IBH Publishing Co.Pvt Ltd.NewDelhi

NON-MAJOR ELECTIVE I

PAPER I

GLOBAL WARMING AND CLIMATE CHANGE

UNIT-I

Role of ozone in environment-ozone layer-ozone depleting gases-Green House Effect

UNIT-II

Temperature profile of the atmosphere- Laps rates-Temperature inversion-effects of inversion on pollution dispersion.

UNIT-III

Causes o f Climate change : Change of Temperature in the environment-melting of ice Pole-sea level rise-role of fossil fuels

UNIT-IV

Mitigation Measures- Cleaner production-alternative fuel measures

UNIT=V

Kyoto Protocol-Intergovernmental Panel on Climate change (IPCC)-

REFERENCES

Annon 1996. Climate change 1995: Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press, Cambridge.

Annon. 2001.Intergovernmental Panel on Climate change (IPCC) Climate change 2001. Third Assessment Report (Volume I). Cambridge University Press, Cambridge

Annon.2005. World Health Organization. Climate and Health. Fact sheet. July.

Gosain, A.K. and Rao,S. 2003. Climate change and India: Vulnerability Assessment and Adaptation. Eds. Shukla,P.R. Universities Press Pvt. Ltd.Hyderabad. pp462

Houghton,J. 2005. Global warming: The Complete Briefing. Cambridge: Cambridge University Press.Cambridge.

Saha,T.K. 2008. Ecology and Environmental Biology. Books and Allied (P) Ltd. Kokata. Pp610.

Lakshmipathy,M., S.R.Ramanan, R.Sathyanathan and J.S.Sudarsahn. 2009. Proceedings of the National Conference on Effect of climate change and sustainable resource management .SRM University, Kattankallathur. pp316.

Rao,M.N, Datar,M.Y. and Reddy,S. 1997. Vermicomposting-A Technological option for solid waste management .Ujjain, India.

IV SEMESTER

PAPER VI

ENVIRONMENTAL TOXICOLOGY

UNIT-I

Principles of toxicology- introduction – classification of toxic agents- toxic responses-mechanisms of toxicity- reaction of the toxicant with target molecules

UNIT-II

Factors influencing toxicity- abiotic and biotic factors- interaction of chemicals- bioaccumulation and biomagnification- Bio chemical effects of co, Nitrogen oxide, sulphurdioxide, ozone & PAN.

UNIT-III

Risk assessment – introduction – definition, hazards identification, risk characterization- exposure assessment.

UNIT-IV

Production of mycotoxins in general – fungal toxins – bacterial toxins – exo and endo toxins – viral toxins, algal toxins – teratogen – carcinogen and mutagens – causes mode and evaluation.

UNIT-V

Chemistry of Toxicology-Pesticides – Heavy metals – cadmium – mercury – lead – chromium – zinc – Inpact on Man animals & Plants.

REFERENCES

1. Casseret, L. J and Doull, J (1982) Toxicology. The basic science of Poisons. Macmillan publishers, New York.
2. Stake, M. Y. Mido, M.S. Sethi, S.A. Iqbal, H. Yasuhisa, S. Taguchi (1997) environmental Toxicology, Discovery publishing house, New Delhi.
3. De, A. K. (1986) Environmental Chemistry, Willey Eastern Limited, New Delhi.
4. Timbrel (1989) Elements Toxicology, British Council Library.
5. Trivedy, R. K (1994) Encyclopaedia of Environmental Pollution and Control. Enviromedia publications, Karad.

PAPER VII

ENVIRONMENTAL MICROBIOLOGY

UNIT–I

History and discovery of microorganisms - Spontaneous generation - Germ Theory of disease, Immunity – chemotherapy.

UNIT-II

Prokaryotic and Eukaryotic cell

Structure of bacteria, virus, fungi, yeast and Algae

Growth and reproduction of bacteria and virus -

UNIT-III

Sterilization-physical and chemical methods

Culture Techniques- Types of media.- Micro organisms in Industry – Production of lactic acid, Aminoacid, 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

REFERENCES

1. Michael J. Pelczar, J.R.E.C.S. Chan Noel R.Krieg (1993) Microbiology, Tata Mc Graw 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 & Distributors.

PAPER VIII

NATURAL RESOURCES & MANAGEMENT

UNIT-I

Introduction to Natural Resources – Classification of natural resources – List of natural resources – Values of natural resources - Demands on Natural Resources - Population, lifestyle and natural resources - Impact of poor natural resource management.

UNIT-II

Land resources – Land: Definition - Land use pattern in India. Waste Land: Types. Desertification: Definition - Causes and impacts.

UNIT-III

Water resources – Hydrological cycle – Surface water - Ground water:. Dams: Uses and impacts on environment. Marine resources: Biotic and abiotic resources.

UNIT-IV

Living Resources-Agriculture-types of cultivation-high yielding varieties –HYV chemicals fertilizers& their impacts-Microbes-useful& harmful bacteria in soil , water ,Air – fungi beneficial & harmful.

UNIT-V

Forest and Mineral Resources forest produce – food- fodder – fuel wood. Fiber – Timber –Minerals –Metal & non metal resources, non – conventional energy resources

REFERENCES

1. Bali, S (2000) Land Resource Management in India. Souvenir of International Conference on Land Resource Management for food, employment and environmental security, 9 – 13 November, 2000. Organized by Soil Conservation Society of India. Pp. 29 – 48.
2. Department of Land Resources (2000) Ministry of Rural Development, Government of India, New Delhi.
3. Kovda, V. A. (1977) Arid land Irrigation and soil fertility: Problems of salinity, alkalinity, compaction. In Arid land Irrigation in Developing Countries: Environmentl Problems and Effects. Ed., by E. Barton Worthington. Oxford: Pergamon Press.
4. Agarwal, K.M., Sikdar, P.K., Deb., S.C (2005) A Text Book of Environment, Macmillan India Limited.

CORE PRACTICAL II

ENVIRONMENTAL CHEMISTRY AND COMPUTER SCIENCES

1. Calculation of Oxidation number of Cr in K2Cr2O7, Mn in KMnO4 ,
2. Standardization of pH with buffer solutions (4, 7 and 9).
3. Measurement of pH of acidic and basic solution using pH meter
4. Volumetric titration – Strong acid vs Strong base. Calculation of end point using V1N1=V2N2.
5. Conductometric titration – Strong acid vs Strong base. Calculation of end point using graph.
6. Graphical representation of data
7. Computation of mean, mode, median, standard deviation.
   (Using softwares – Excel, SYSTAT)

CORE PRACTICAL III

ENVIRONMENTAL TOXICOLOGY AND MICROBIOLOGY

1. Estimation of LC_{50} and LD_{50} for a given heavy metal using a suitable organisms
2. Demonstration – BOD
3. Preparation of culture media for Micro organisms
4. To show the presence of microorganisms around us.
5. Gram staining of bacteria.
6. Isolation of Microorganisms from the soil.
7. Observation of root nodule bacteria.
8. Isolation of root nodule bacteria.

ALLIED II

PAPER IV

ENVIRONMENT AND ECO TOURISM

UNIT-I

Agriculture – Contribution to Economic development – food problem – land reforms in India, Bhoodan movement – Green revolution – Panchayat Raj – Community development Projects – Co – Operative movement.

UNIT-II

Rural social structure – caste system, joint family- religion caste, cultural social & psychological barriers to economic development – over coming – resistance to change.

UNIT-III

Concepts of Tourism – Classification – Religious tourism – Cultural tourism – Heritage tourism – Monumental tourism – Adventure tourism – Mars tourism – Sustainable tourism – Consumptive & non consumptive tourism.

UNIT-IV

Principles of Ecotourism – Types of Ecotourism – Concepts of Ecotourism – Objectives of Ecotourism – benefits of Ecotourism – trends affecting ecotourism.

UNIT-V

Impact of Ecotourism – Economic impacts (fiscal impacts, concepts & Methods) – Types and degree of impacts from Ecotourism activities – Socio cultural impacts – Ecotourism related organization – Ecotourism Research disasters & Ecotourism.

REFERENCES

1. Agarwal, A. N (1980) Indian Agriculture, Vikas publishing House, New Delhi,
2. Weaver, D. B (2001) The Encyclopedia of Ecotourism, CABI, Publishing, U.K.
3. Sinha, P. C (2003) Encyclopedia of Ecotourism, Vol – I, II & III, Anmol publications Pvt. Ltd, New Delhi.
4. Bhatia, A. K (1978) Tourism in India

SKILL BASED SUBJECT II
PAPER II

SOLID WASTE MANAGEMENT AND VERMITECH

UNIT-I

Solid waste generation-characteristics-Physico-chemical characteristics
Problems and Impacts of Municipal Solid Waste(MSW)-Methane emission due to MSW

UNIT-II

Disposal of Municipal Solid Waste(MSW)-Collection-Process of waste collection
Segregation- Non-compostable-reusable-recyclable- non recyclable-compostable-hazardous-

UNIT-III

Composting types: Windrow method-Aerobic composting- Vermicomposting-Compost pit -Garbage filled compost pit-Composed garbage

UNIT-IV

VERMITECH
Vermibank-Earthworm species-*Eisenia foetida, Eudrilus euginiae* -Morphology and life cycle

UNIT-V

Vermicomposting –Sources of organic waste- Vermicompost Process – vermicast-Application of vermicompot-Preparation of organic by products:Vermi wash-Amritha karisal-Organic insecticide-Humic acid-Advantage of Vermitech

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NON MAJOR ELECTIVE II

PAPER II

ENVIRONMENTAL SAFETY, HEALTH AND MANAGEMENT

UNIT-I

Definition- need for good health- factors affecting health. Types of diseases {deficiency, infection, pollution diseases}. Personal hygiene- food {balanced diet). Food habits & cleanliness, food adulterants, avoiding smoking, drugs & alcohols.

UNIT-II

Public health: communicable diseases, mode of transmission {epidemic and endemic diseases). Management of hygiene in public places {railway stations, bus stands and other public places).

UNIT-III

Occupational health and safety. Occupational health and hazards-physical-chemical and biological. Occupational diseases- prevention and control.

UNIT-IV

Industrial safety and management techniques:

Industrial safety standards and regulations. Accidents-definitions-prevention and control.

UNIT-V

Safety management system- concepts of safety management systems- EMS ISO 14000 and 14001. OSHA. PUBLIC LIABILITY INSURANCE ACT- MINING ACT.

REFERENCES

1. Scoot, R..M. 1997.Basic concepts of industrial hygiene, Lewis Publisher, New York
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V SEMESTER

PAPER IX

METHODOLOGY IN ENVIRONMENTAL ANALYSIS

UNIT-I

Environmental analysis:

Water sampling: Sampling stations-Collection of water samples-Handling and Preservation.

Water analysis:

Physical parameters: Colour-Temperature-Transparency-Turbidity

UNIT- II

Chemical parameters: pH-Electrical conductivity-Total solids-Total suspended solids- Dissolved oxygen- Carbonates-bicarbonates-Hardness-Calcium-Magnesium-Total alkalinity-Fluoride- Iron- Nitrate-nitrite –Phosphate

Biochemical Oxygen Demand(BOD)-Chemical Oxygen Demand(COD).

Biological Parameters:

Macrophytes-Phytoplankton-Zooplankton-Primary Productivity

Bacteriological measurements-Standard Plate count method-MPN(Most Probable number)

UNIT- III

Soil /Sediment Analysis:

Physical parameters: Density-Specific gravity-Texture

Chemical Parameters: pH-Electrical conductivity-Total Alkalinity-Chloride-Nitrates-Phosphate-Iron-organic matter

Biological parameters: Animal population-Benthos-Bacteria

UNIT- IV

Air Analysis:

Physical parameters: Wind velocity-Atmospheric pressure- Temperature-Humidity

Chemical Parameters: Carbon dioxide- Carbon monoxide-Sulphur dioxide-Nitrogen oxide-

UNIT- V

Remote sensing:

Principle – Types

GIS-Components-Types of maps-Digitizer-Scanner-Scale of measurements

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PAPER X

ENVIRONMENTAL POLLUTION AND MANAGEMENT

UNIT-I

Water pollution – sources & types of water pollution – physical, chemical & biological – effect of water pollution. Drinking water quality standards waste water treatment – primary, secondary, tertiary-water pollution prevention & control act – 1974.

UNIT-II

Air pollution –structure and composition of atmosphere – classification, sources & effects of air pollution – Acid rain –green house effect – 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 Act 1981.

UNIT-IV

Soil Pollution – soil pollutants – types – sources, effects & Control. Noise Pollution – sources effects & Control.

UNIT-V

Government Agencies & Programs – The Tiwari committee – creation of NCEPC, Department of Environment & Forest – Function of State Pollution Control Board.

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PAPER XI

PRINICPLES OF MANAGEMENT

UNIT-I

Functions of Management - Planning, Organising 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

Organisational 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 organisation.

UNIT-IV

Management Control Systems, Feed back mechanism, control techniques - budgeting, programme evaluation and audits.

UNIT-V

Setting environmental goals, resource mobilization, use of natural resource and environmental indicators, output budgeting, monitoring and evaluating environmental programmes. Case studies in selected industries like garment manufacturing, tanneries focused on the economics and management of effluent treatment plants.

REFERENCES

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CORE PRACTICAL IV

METHODOLOGY IN ENVIRONMENTAL ANALYSIS AND MANAGEMENT

Water analysis:

1. Estimation of Turbidity
2. Estimation of pH
3. Estimation of Chloride
4. Estimation of Total dissolved solids-
5. Estimation of Dissolved oxygen-
6. Estimation of Carbonates-bicarbonates-
7. Estimation of Total Hardness
8. Estimation of Phosphate
9. Air Sampling (High volume air sampler) - Demonstration
10. Pollution Indicators

.

ELECTIVE I

PAPER I

ENVIRONMENTAL IMPACT ASSESSMENT

UNIT-I

EIA – Introduction – Concept of EIA- Scope and object of EIA – Organization responsible for EIA – Site selection and area classification- Siting and setting criteria for EIA projects.

UNIT-II

Description of the environmental setting – Inclusion or Exclusion of environmental Items – Some suggested approaches for developing a list of environmental Factors – Informational Sources for Environmental factors.

UNIT-III

Various steps of EIA – Content of EIA – Assessment methodology- Ad-hoc, Overlay, Network, Matrix and checklist . Cost benefit analysis - Case studies, Hydroelectric projects , Mining, Power plant Roads and airports.

UNIT-IV

Environmental Impact Assessment Notification (1994): Procedure for Environmental Clearance, List of the projects requiring Environmental Clearance, Composition of Expert Committee for Impact Assessment, Public hearing Committee, Procedure for public hearing - Project clearance.

UNIT-V

Detailed content of EIS – Use of visual display methods – Statement documentation – general writing suggestion.

REFERNCE BOOKS

1. Rau, J.G. and Wooten, D.C (1980) Environmental Impact Analysis Hand Book, Mc Graw Hill, USA.
2. Canter, L. W. (1977) Environmental Impact Assessment. McGraw-Hill, New York.
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SKILL BASED SUBJECT III

PAPER III

FOREST CONSERVATION AND MANAGEMENT

UNIT I

Forest cover – utilization & over exploitation of forest – deforestation – modes of deforestation – causes – impact of deforestation on environment.

UNIT II

Forest resources – importance of forest – ecological significance – forest types.

UNIT III

Utilization of forest products: Timber, fire wood, pulp, fodder, medicinal plants. Plant indicators. Forest check, flood & soil erosion – Sacred groves.

UNIT IV

Forest Movement and people's participation – environmental protection – Tribal community
forestry :social forestry Afforestation – Agroforestry – Chipko movement – Apiko movement.

UNIT V

Forest conservation – Protection from fire – Prevention of fire – Regulation of tree felling, fencing, protection from wild animals, control of pest- Forest conservation Act1980.

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VI SEMESTER

PAPER XII

CONSERVATION BIOLOGY AND MANAGEMENT

UNIT I:

Biodiversity /Wildlife Conservation: Why Conservation? Importance and need of conservation.
Loss of biodiversity: Reasons for biodiversity loss-Threats to biodiversity – habitat loss ,habitat fragmentation, overexploitation, poaching, fire, natural disasters

IUCN Threatened Species Categories: Red data book- Extinct, Endangered, Vulnerable, Rare

UNIT II:

Biodiversity/Wildlife Management: Concepts and principles.

Conservation Strategies-Methods of Conservation *In situ* Conservation - Wildlife Sanctuaries :

Mudumalai,Mundathurai, Kalakad, Point Calimere, Vedanthangal, National Parks: Guindy, Silent Valley, Bandipur, Kaziranga, Gir, Biosphere Reserves : Nilgiri, Gulf of Mannar, Nandadevi,

UNIT III:

Ex situ conservation: Botanic gardens ,Zoological Parks (Zoos) ,Gene banks, Seed banks,

DNA finger printing. Special projects for conservation: Project Tiger, Gir Lion project, Project elephant, Crocodile Project.

UNIT IV:

Wildlife Administration and Legislation

Wildlife (Protection) Act 1972 , Wildlife (Protection) Amendment Act,2002. Forest management- Afforestation-Social Forestry-Chipko movement.

UNIT V:

Role of Government and Non-Governmental organizations in biodiversity/wildlife conservation:

Ministry of Environment and Forests, Bombay Natural History Society(BNHS) International Union for Conservation of Nature and Natural Resources(IUCN),World Wide Fund for Nature (WWF), Convention on Trade in Endangered Species of wildlife fauna (CITES), Biodiversity/Wildlife Education. Role of media.

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2. GilePrimack, R.B.(1993) Essentials of Conservation Biology. Sinauer Associates Inc. Publishers.Massachussets pp564
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PAPER XIII

DISASTER MANAGEMENT

UNIT 1

Disaster – Introduction –Types of natural calamities, major and minor calamities – impact of calamities.

UNIT II

Natural disaster – cyclone – Tsunami – flood – Landslides – earth quake.

UNIT III

Manmade disaster – Wars – Biological war (introduction of pathogens) – misuse of atomic bombs –major accidents from industries e.g. Bhopal. Lov canal disaster – London Smog.

UNIT IV

Medical Management of disaster – Disaster Impacts and response – Identification of dead – Search rescue –first and relief phase – Vaccination, basic sanitation and personal hygiene.

UNIT V

Environmental Disaster – Assessment, Planning – mitigation program – preparedness – resettlement rehabilitation – role of NGOS, Gos (relief camp), Psychotherapy – simplified yoga and meditation, stress management.

REFERENCES

1. Tsunami. A text book from Department of Science and Technology, New Delhi, p90.
2. Proceedings "Brainstorming seminar on Disaster Management and Mitigation programmes. Sri Venkateswara University, Tirupati, P 150.
3. Pollution control Legislations. Environmental Laws – Vol. II. Tamilnadu Pollution Control Board.
4. Shailaendra K. Singh, Subash C. Kundan and Shobu Singh (1998). Disaster Management. Mittal Publications. New Delhi.
5. Natural disasters (1980) – A guide for relief workers – JAC Adhyatma Sadhema, Kendra Mehrani, New Delhi.

PAPER XIV

ENVIRONMENTAL SAFETY, HEALTH AND MANAGEMENT

UNIT-I

Definition; Need for good health; factors affecting health, types of diseases (Deficiency, infection, pollution diseases) Personal hygiene – Food (Balanced die) food habits and cleanliness, food adulterants, avoiding smoking, drugs and alcohol.

UNIT-II

Public Health: Communicable diseases, Mode of transmission (Epidemic and endemic diseases), Management of Hygiene in public places (Railway stations, Bus stands and other public places) hospitals – Nosocomial infections and hygiene in Educational institutions.

UNIT-III

Occupational Health and Safety: Occupational health and hazards – physical, chemical and biological hazards. Principles of ergonomics. Occupational diseases – prevention and control. Health protection measures for workers – health education – first –aid. Management of medical emergencies.

UNIT-IV

Industrial Safety and Management techniques: Industrial Safety standards and regulations. Accidents – definition, frequency rate – prevention and control. Risk Analysis and assessment. Work study, work measurement – measurement of skills, Safety cost and expenses. Principles of functions and safety management.

UNIT-V

Safety Management System: Concepts of safety management systems. Environmental Management Systems (EMS) ISO 14000 and 14001. OSHA and NIOSH compliance, Compensation Act, Public Liability Insurance Act, Mining Act, Good Manufacturing Practices (GMP) and Good Laboratory Management Practices (GLP).

REFERENCES:

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2. Peterson, R. D., and Cohen, J. M. the complete (vide to OSHA Compliance, Lewis Publishers, New York, 1997.
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DISASTER MANAGEMENT

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5. Natural disasters (1980) – A guide for relief workers – JAC Adhyatma Sadhema, Kendra Mehrani, New Delhi.

PAPER XIV

ENVIRONMENTAL SAFETY, HEALTH AND MANAGEMENT

UNIT-I

Definition- need for good health- factors affecting health. Types of diseases {deficiency, infection, pollution diseases}. Personal hygiene- food (balanced diet). Food habits & cleanliness, food adulterants, avoiding smoking, drugs & alcohols.

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5. Khan M.A.O., John.P, Bederka.S. , 1974. Survival in toxic environment, Academic Press, New York .

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13. Estimation of Chloride
14. Estimation of Total dissolved solids-
15. Estimation of Dissolved oxygen-
16. Estimation of Carbonates-bicarbonates-
17. Estimation of Total Hardness
18. Estimation of Phosphate
19. Air Sampling (High volume air sampler) - Demonstration
20. Pollution Indicators

SKILL BASED SUBJECT IV

PAPER IV

MEDICAL ZOOLOGY

UNIT I

Medical Protozoology: Plasmodium :Detailed study- Plasmodium-Structure, life cycle, mode of transmission, Disease caused, Symptoms, treatment and Preventive measures

Brief account-Amoebiasis

UNIT II

Medical Helminthology: Detailed study- Ascaris: Structure, life cycle, mode of transmission, Disease caused, Symptoms, treatment and Preventive measures

Brief account – Ancylostomiasis, Enterobiasis, Trichuriasis, Filariasis

UNIT III

Medical Entomology: Detailed study-Mosquitoes and House fly-Structure, life cycle, role as vectors- and control measures

Diseases transmitted by Cockroaches, flea, louse.

UNIT IV

Medical Microbiology: Bacterial diseases: Cholera, typhoid, tuberculosis

Viral diseases: Small pox, measles, rabies, encephalitis, AIDS

UNIT V

Methods of diagnosing Parasitic diseases

Examination of stools: Direct examination- sedimentation technique, floatation technique,

Examination of blood-thick smear and thin smear method

Bacterial examination: Gram Positive and Gram Negative staining method

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