U.G Department of Environmental Science
B B M K UNIVERSITY, DHANBAD

Syllabus of B.Sc. (H) (Environmental Science

Semester I

Course	Code of Paper	Name of Paper	Internal Marks	P.M	External Marks	P.M	Total Marks
(A) Core Course	C1	Concepts of Environmental Science	15	07	60	27	75
	C2	Environmental Factors and Statistical Analysis of environmental Scince	15	07	60	27	75
	P 1	Practicals Based in C1 & C2	10	04	40	18	50
(B) AECC Ability Enhancement Compulsory Coarse	AECC 1	Communicative English/ MIL	10	04	40	18	50
(C) Generic Elective Theory	GE 1	Chemistry	15	06	60	24	75
GE Practical		Practical	05	02	20	08	25

Semester II

Course	Code of Paper	Name of Paper	Internal Marks	P.M	External Marks	P.M	Total Marks
(A) Core Course	C3	Productivity & Energy Flow	15	07	60	27	75
	C4	Biogeochemical Cycles and concept of Natural resources	15	07	60	27	75
	P 2	Practical Based in C3 & C4	10	04	40	18	50
(B) AECC Ability Enhancement Compulsory Coarse	AECC 2	Principles of Ecology	10	04	40	18	50
(C) Generic Elective	GE 2 Theory	Chemistry	15	06	60	24	75
	Practical	Practical	05	02	20	08	25

Semester III

Course	Code of Paper	Name of Paper	Internal Marks	P.M	External Marks	P.M	Total marks
(A) Core Course	C5	Community & Biomes	15	07	60	27	75
	C6	Population and conservation of Natural Resources	15	07	60	27	75
	C7	Biological Instruments	15	07	60	27	75
	P 3	Practicals Based in C5, C6	10	04	40	18	50
(B) AECC Ability Enhancement Compulsory Coarse	SEC 1	Environment & Public health	10	04	40	18	50
(C) Generic Elective	GE 3	Chemistry/ Botany/ Physics/zoology/Maths	15	06	60	24	75
		Practicals	02	02	20	08	25

Semester IV

Course	Code of Paper	Name of Paper	Internal Exam	P.M	External Exam	P.M	Total marks
(A) Core Course	C8	Conservation of Biodiversity, wildlife Management, environmental Policy	15	07	60	27	75
	C9	Freshwater Marine & Soil Environment	15	07	60	27	75
	C10	Distribution of Rocks & GIS & Remote Sensing	15	07	60	27	75
	P 4	Practical Based in C8, C9	10	04	40	18	50
(B) AECC Ability Enhancement Compulsory Coarse	SEC 2	Science & Life	10	04	40	18	50
(C) Generic Elective	GE 4	Chemistry/ Botany/ Physics/zoology/maths	15	06	60	24	75
		Practical	05	02	20	08	25

Semester V

Course	Code of Paper	Name of Paper	Internal Marks	P.M	External Marks	P.M	Total Marks
(A) Core Course	C11	Environmental Pollution & Waste Management	15	07	60	27	75
	C12	Environmental Impact Assesment	15	07	60	27	75
	P5	Practical based on C11 &C12	10	04	40	18	50
(B)DSE DisciplineSpecific Elective	DSE 1	Ecology VS economy	15	07	60	27	75
	DSE 2	Ecorestoration & Reforestation	15	07	60	27	75
	P6	Noise Pollution & measurement	15	07	40	18	50

Semester VI

Course	Code of Paper	Name of Paper	Internal marks	P.M	External marks	P.M	Total marks
(A) Core Course	C13	Energy Resources	15	07	60	27	75
	C14	Environmental Laws	15	07	60	27	75
	P7	Air Pollution & Monitoring	10	06	35	27	75
(B) DSE Discipline Specific Elective	DSE 3	Natural Catastropes & Disaster Management	15	07	60	27	75
	DSE 4	Toxicology & Case Study	15	07	60	27	75
	P8	Report writing, Presentation & Viva Based on Industrial Training	15	07	60	27	75

Semester I

There are three groups, Group A, group B, & group C where group A is compulsory and consists of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

C1 Fundamentals of environmental Science

Unit 1: The Biosphere

History & Scope of environmental science, importance of environmental Science, global concept of biosphere, Biomes, ecosystem, Subdivisions of the biosphere: lithosphere atmosphere, hydrosphere. Impact of Man on Biosphere: Environmental Problems (Global Warming, ozone Depletion & Acid Rain) Environmental priority in India.

Unit II: System, concept & The Ecosystems

Concept pretaining to the ecosystem. Ecosystem organization: structural & Function, concepts of tropic levels , food chain, food webs. Comparision of ecosystem through Number, biomass and energy Pyramids, impact of man on ecosystem, System Concept, System analyses, system measurements. Concept of ecosystem Dynamics: stability of ecosystems & Control Mechanisms: homeostasis, homeorhesis, microcosm & Mesocoms.

C2: Environmental Factors & Statistical Analysis of environmental parameters

UNIT 1: ENVIRONMENTAL FACTORS

Concept of environmental factors: maximum, minimum and optimum.

1) Light
2) Heat
3) Carbon dioxide
4) Oxygen

Unit 2: Statistical analysis of environmental parameters

1) Data structure and organization
2) Central tendency: mean, medium, mode
3) Major of dispersion : standarad deviation , standard error ,variance , co-relation regression.
4) Test of signifance, T test, chi-square test, ANOVA basics.
5) System modling : analytical models , stochastic models,

P 1: Practical Based on C1 & C2

1) Studying of function and operation of important instrument and equipment : thermometer ,pH, conductivity meter, sampling bottle, plankton net , swedgewick rafter, noise level meter
2) Frequency, density, dominance calculation of the vegetation in nearby area quadrate, calculate important value index (IVI)
3) Determine the area species curve by quadrate method.
4) Determine the density , frequency of the vegetation by transect method.
5) Particle record .
6) Viva voice.

Suggested Readings:

1. E.P. Odum and G.W. Barrett. 2005. Fundamentals of Ecology. Cengage Learning India Pvt. Ltd.
2. J.S. Singh, S.P. Singh and S.R. Gupta. 2008. Ecology, Environment & Resource Conservation. Anamaya Publications.

Semester II

There are three groups, Group A, group B, & group C where group A is compulsory and consis of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

C3: Productivity & Energy Flow

Unit I: Productivity in Ecosystems

- Productivity in ecosystems, concepts of Gross production, Net Production, net ecosystem Production: Primary Production, Factor Effecting Primary production.
- Global primary productivity & its estimation,
- Secondary Production, factors effecting secondary production, efficiency of production at various levels.
- Succession & Changes in productivity.

Unit II: Energy Flow through Ecosystem

- Concept of energy, energy reaching the earth, light as a energy Carrier, Energy transduction with respect to the laws of thermodynamics, concept of entropy, enthalpy, the ecosystem as a thermodymics. Energy based for plants, photosynthesis, energy fixation and production, energy flow through the food chain, the Y –model.
- Lindeman's tropic dynamic aspect.
- Energy flow models: basic or universal model, energy flow models of ecosystems (aquatic and terrestrial), comparsion of energy flow.

C4: Biogeochemical Cycles & Concept of Natural Resources

Unit 1: BIOGEOCHEMICAL CYCLES

- Water cycle
- Carbon cycle
- Phosphorus cycle
- Sulphur cycle
- Impact of man on biogeochemical cycles

Unit2 : CONCEPT OF NATURAL RESOURCES

- Natural Resources: Concept of resources , types of resources.
- Water resources.
- Land resources.
- Mineral resources.

P 2: Practicals based on C3 & C4 PAPERS

1. Analysis of common aquatic parameters: Oxygen, Carbon dioxide, pH, alkalinity.
2. Analysis of common soil parameters: pH, alkalinity, water holding capacity of soil.
3. Common soil and aquatic biota
4. Practical record.
5. Viva-voice

Suggested Readings:

1. E.P. Odum and G.W. Barrett. 2005. Fundamentals of Ecology. Cengage Learning India Pvt. Ltd.
2. J.S. Singh, S.P. Singh and S.R. Gupta. 2008. Ecology, Environment & Resource Conservation. Anamaya Publications.

Semester III

There are three groups, Group A, group B, & group C where group A is compulsory and consis of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

C5: Community Concepts & Biomes

Unit 1: COMMUNITY

- The community concept.
- Development of the community through succession.
- Community organization and stratification.
- Concept of biogeography and continental drift.

Unit 2: BIOMES

- The biome concept.
- Principal biomes of the world.
- Temperate forest biome.
- Tundra biome.
- Grassland biome.

Suggested Readings:

- Begon, M., Townsend, C. R., and Harper, J. L.. *Ecology from Individuals to Ecosystems.* Wiley-Blackwell, USA. 2005.
- Botkin, Daniel B. and Keller, Edward A. *Environmental Science: Earth as a Living Planet*. 6th ed. John Wiley & Sons, USA, 2007.
- Chapman, J. L. and Reiss, M. J. *Ecology: Principles and Applications.* Cambridge University Press, UK., 1998.
- Cunningham, W. P. and Cunningham, M. A. Principles of Environment Science.

Enquiry and Applications. 2nd ed. Tata McGraw Hill, New Delhi, India, 2004.

Paper C 6: Population & Conservation of Natural Resources

Unit 1: Population

● The population concept.
● Age structure and significance.
● Survivorship curves, demographic transition,
● Population growth rate, pearls-verhulst equcation.
●Population regulation.
● Human population and environmental impact; Population and its impact on resources.

Unit 2: Conservation of Natural Resources

- Concept of conservation
- Relation between population, proverty and pollution
- Conservation of water resources
- Conservation of land resources
- Conservation of mineral resources
- Conservation of energy resources

Suggested Reading

- Hunter, Malcolm L., Jr., and Gibbs, James P. *Fundamentals of Conservation Biology*. 3rd ed. Wiley-Blackwell. 2006.

- Jeffries, M. *Biodiversity and Conservation*. 2nd ed. Routledge, UK. 1997.

Reports And Statistics on Dynamic Ground Water Resources of India, Govt. Of India, Ministry of Water Resources.

C7 : Biological Instruments

UNIT I

Concepts of Biological instruments, Need of Biological instruments, Basic Biological instruments: pH, autoclave.

UNIT II

Centrifuge , types of centrifuge, Chromatography ,types of chromatography – techniques & principles., spectrophotometer, colorimeter.

Suggested Readings:

- Handbook of Biological Instruments, S. Chand Publications
- APHA

P 3: Practicals based on C5 ,C6 & C7

1. Principles of working of a spectrophotometer and chromatography.
2. Quantitative estimation of plankton using Sedgwick rafter.
3. Identification of Common Planktons.
4. Practical Record.
5. Viva voice.

Semester IV

There are three groups, Group A, group B, & group C where group A is compulsory and consist of Multiple choice type/ short answer/ true- false type questions. Out of the rest two group, group B & group C , answer any three questions. Answering at least one question from each group.

C 8: Conservation of Biodiversity, Wildlife management, environmental Policy

Unit I: Conservation of Biodiversity

- Biodiversity conservation : levels of Biodiversity, types and distribution of biodiversity, causes of biodiversity destruction, need for conservation of biodiversity, steps in the management & conservation of biodiversity, in-situ conservation, ex-situ conservation, inter-situ conservation, Role of IT in conservation of floras & faunnas

Unit II: Wild life Management

- Wildlife management, national parks, biosphere reserves, sanctuaries . Concept of various conservation project implemented in India: Project Tiger, Project Rihno, Project Crocodile, Project Elephant; IUCN Catagories of threatened species

C 9: Freshwater, marine & Soil Habitat

Unit I: Freshwater and Marine Habitat

- Fresh habitat: lotics and lentic habitats, physical,chemical, and biological characteristics.

  Marine Habitat: Zonation,types of shores, deep sea adaptations.

Unit II: Estuaries & Soil Habitat

- Estuaries: Characteristics, adaptation on organisms living in estruries, important estuaries in India.
- Soil: formation, profile, zonation , classification and types of soil soils found in India; physical, chemical and biological characteristicts,
- C/N Ratio, Soil Indicators, Factors effecting Soil Quality – Harvesting, Fertilizers

Semester IV

There are three groups, Group A, group B, & group C where group A is compulsory and consis of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

- **C 10: Distribution of Rocks & GIS and remote sensing**

- **Unit I : Rocks**

- Structure of earth, Composition of Earth, Rocks: Definition, Formation, Types of rocks, Distribution on India.

- **Unit II: GIS & Remote Sensing**

  Remote Sensing, Physical Basis for remote sensing, Remote sensing process, Plateform & Sensors for remote sensing, remote sensing satellite, Ground station, system for data collection, passive system & Active system, Microwave Remote sensing. Applications of remote sensing.

  Geographic Information System: basic concepts , GIS tools & Components, data for GIS Procedure perspective for GIS, Integration of related system in GIS, Application Of GIS.

P 4: Practical Based on C8 & C9 , C10 papers

1. Measurement of chloride in water sample.
2. Measurement of phosphate in a water sample.
3. Preparation of project on a habitat visited.
4. Viva- voice.

5. Practical Record

Suggested Readings:

1. Anne E. Magurran. 2003. Ecological diversity and its measurements. Blackwell Publications.
2. J.S.Singh, S.P. Singh and S.R. Gupta. 2008. Ecology, Environment and Resource Conservation. Anamaya Publications (New Delhi).
3. V.H. Heywood and Watson R.T. (Ed). 1995. Global Biodiversity Assessment: UNEP. Cambridge University Press Threats to biodiversity: Natural and anthropogenic, species extinctions, IUCN threat
categories, Red data book, Invasions: causes and impact.
Biodiversity conservation, principles and strategies; *in-situ* and *ex-situ* conservation, Protected Area Network.
Biodiversity Hot spots: concepts, distribution and importance.
Use of biodiversity: Source of food, medicine, raw material, aesthetic and cultural.
Biodiversity prospecting.

Semester V

There sare three groups, Group A, group B, & group C where group A is compulsory and consis of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

C 11: ENVIRONMENTAL POLLUTION

Unit 1 : WATER POLLUTION , AIR POLLUTION:

- Concept of pollution: types of pollutants, entry into the environment and biological systems, bioaccumulation, biomagnifications, stress and strain.
- Water pollution: definition , standards of potable and drinking water, types, sources, effects, prevention and control, treatment, eutrophication.

- Air pollution: definition, ambient standards , treatment , Acid rain, photochemical smog, green house effect, ozone depletion, automobile pollution,& its control measures, oxides of SO_x, NO_x, hydrocarbons & Flurocarbons, CO_x SPM,

Unit 2: SOIL, SOUND, RADIATION POLLUTION:

- Soil pollution: definition, sources, types, effects and control. Factors effecting Soil Quality- Harvesting, Fertilizers and Insecticides & Pesticides.
- Sound pollution- Basic concepts. Noise –Sources effect & Control measures, types of Dieases Due to Noise Pollution
- Radiation pollution – Basic Concepts. Types of Radioactive pollutants, Hazards & Its control Measures, Case study of Nagasaki & Hiroshima
- Standards of Air, Water, Soil & Noise Quality

Suggested Readings:

- 1. A. K. De. (3rd Ed). 2008 Environmental Chemistry. New Age Publications India Ltd.
- 2. I. C. Shaw and J. Chadwick. 1997. Principles of Environmental Toxicology. Taylor&
- Francis Ltd.
- 3. S.C. Santra. 2011. Environmental Science. New Central Book Agency.
- 4. Ira. S. Richards. 2008. Principles and Practices of Toxicology in Public Health. Jones
- and Barlett Publications

C 12:Waste Management & Environmental impact Assessment

There are three groups, Group A, group B, & group C where group A is compulsory and consist of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

Waste Management

Unit I: Basic Concepts of Wastes

Basic Concepts of Wastes – Types, Sources & Sepration, Solid Waste, Liquid waste, hazardous wastes, methods of treatment- Waste water treatment, factors effecting soil quality, Ecofriendly waste managements- Mining, coal mining, Agricultural, Petroleum Refining Power Plants, Iron & Steel Industries, Red mud, Impact of Wastes In human Health

Unit II: Environmental Impact Assessment

EIA: Introduction, need, preliminary proposal, public participation, formal proposal, sceening, impact identification, scoping, impact forecasting, EIS statement, monitoring of environmental impact Environmental issues of India: Slient Valley project, Chipko movement, Appiko movement, Narmada Bachao Andolan, Sardar Sarovar Project, Tehri Project

Suggested Reading

- Acharya, D.B. and Singh, M. *Hospital Waste Management*. Minerva Press, Delhi. 2003.

Alleman, J. E. and Karanagh, J. T. *Industrial Waste*. Ann Arbor Science.1982.

- Bhatia, S.C. *Solid and Hazardous Waste Management*. Atlantic Publishers.2007.
- Blackman, W.C. *Basic Hazardous Waste Management*. CRC Press, USA. 2001.
- Evans, G. *Biowaste and Biological Waste Treatment.* James and James (Science

Publishers) Ltd, U.K. 2005.

- Hasan Syed E. Geology and Hazardous Waste Managemet, Prentice Hall, USA, 1996.
- Kreith, F. *Handbook of Solid Waste Management*. McGraw Hill Publishers, USA. 22,1999
- LaGrega M.D., Buckingham, P.L. and Evans J.C., Hazardous Waste Management, McGraw Hill International Publications, Singapore, 1994 – Revised Edition Available – ISBN 0-07-113454-9.
- Moore, J. W. *The changing Environment*. Springer-Verlag. 1986.

DSE 1: Ecology Vs Economy

There are three groups, Group A, group B, & group C where group A is compulsory and consis of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

Unit I: Environmental Economics

Basic Concepts of environmental economics, its applications, Cost Benefit Analysis, Morals & Ethics of Environmental Protection, Ecology VS Economy,

Unit II: Sustainable Development

Concepts of Sustainable development, Carrying Capacit- Definition & Scope of Development Planning, Environmental Education, Institutes & Research Centres in INDIA.

Suggested Readings:

1) Edgar G. et al, 2008, Environmental education, Sense Publishers
2) J.M. Haris,2017, Environmental & natural Resource Economics: A Contemporary approach, 4th Edition, Routledge Publishers.

DSE 2 : Ecorestoration & Reforestation

There are three groups, Group A, group B, & group C where group A is compulsory and consis of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

Unit I : Bioremediation

Basic Concepts of Pollutants, Bioremediation- Concepts , Need & Scope, Concepts of Bioreactors, Environmental Application of Bioremediation, Case Study

Unit II: Cleaning Up of Environments by using plants

Phytoremediation – Basic Concepts, Biological Cleaning up of the environment with plants. Medicinal Plants - their role. Project medicinal Plants, Aforestation, forestry & their types- commercial forestry, production forestry, social forestry, Agro forestry.

Suggested Readings

- Evano, G.H. and Furlong, J.C. *Environmental Biotechnology – Theory and Application.* John Wiley and Sons, USA. 2004.
- Jjemba, P.K. *Environmental Microbiology – Theory and Application.* Science Pub. Inc., USA. 2004.
- Olguin, C. J., Sanchez, G., Hernandez. E. *Environmental Biotechnology and Cleaner Bioprocesses.* Taylor & Francis.2000.
- Pepper, I.L. and Gerba, C.P. *Environmental Microbiology - Laboratory Manaul*. Elsevier, USA. 2005.
- Ratledge, C. and Kristiansen, B. *Basic Biotechnology*. 2nd ed. Cambridge University Press, Cambridge, UK. 2002.

Rittman, B. and McCarty, P. L. *Environmental Biotechnology*: *Principles and Applications*. 2nd edition. Tata McGraw-Hill, USA. 2000.
Rittmann, B.E. and McCarty, P.L. *Environmental Biotechnology – Theory and Application.* McGraw Hill, USA. 2001.

Silver C. S. and DeFries, R. S. *One Earth one Future: - Our Changing Global Environment*. East-West Press Edition, 1991.
Singh, J.S., Singh, S.P. and Gupta, S.R. *Ecology, Environment and Resource Conservation*. Anamaya Publishers, New Delhi, India. 2006.
Speth, J. C. *Global Environmental Challenges – Transitions to a Sustainable World*. Orient Longman Pvt. Ltd., New Delhi. 2004.
UNEP. *Global Environmental Outlook 3: Past, Present and Future*. Earthscan Publications. 2002

P 5: Practical Papers Based on C11 & C 12

1. Determination of phosphate or sulphate in water sample.
2. Determination of SPM in the atmosphere.
3. Knowledge of the common environmental assessment equipments: spectrophotometer, High volume sampler, conductivity meter, DO meter, BOD chamber, Lux meter.
4. Project .
5. Practical record.
6. Viva- voice.

P 6: Noise Pollution & Measurement

- Demonstration of Noise pollution measuring instruments
- Calculation of noise level in your College.
- Calculation of Noise level in Heavy Populated areas.
- Calculation Of Noise level in Silence zones.
- Practical Record
- Viva Voice
- Project

Semester VI

There are three groups, Group A, group B, & group C where group A is compulsory and consis of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

C 13: Energy Resources

Unit I Energy Resources

- Concept of conventional and non Conventional energy resources
- India's present generation of energy from various sources and future planning

- Thermal, hydroelectric and nuclear power generation.

Unit II: Non Conventional or renewable energy Resources

- Wind power
- Water power
- Solar power
- Biomass power
- Geothermal energy, OTEC, Hydrogen power

C 14 : Environmental Law

Unit I: Environmental Laws

- The Air (Preservation & Control Of Pollution)Act, 1981 as amended by Amedment Act, 1987
- The water (preservation & Control of pollution) Act, 1974 as amended Act upto 1988
- Motor vehicle Act, 1988 pretaining to pollution.

Unit II

- The environment Protection Act, 1986, amendments 1991 and rules 1986.
- Wildlife protection Act,1972 amendments 1993 & 2002
- Forest Conservation Act, 1980- amendments upto 1988
- Hazardous waste (managements & Handling) Rules.1989
- Bio-medical waste (Management & Handling) Rules 1998

Internal Assesment: 2

Suggested Readings:

1. M. Dayal. (6th Ed). 1997. Renewable Energy: Environment and Development. Konark Pub. Pvt. Ltd.
2. S. Vandana. 2002. Alternative Energy. APH Publishing Corporation.
3. S. K. Agarwal. 2003. Nuclear Energy: Principles Practice and Prospects. APH Publishing Corporation.
4. P. Chaturvedi. 1995. Bio-Energy Resources. Concept Publications.
5. V S. Mahajan. 1991. National Energy: policy, crisis and growth. Ashish Publishing House.

DSE 3: Natural Catastrophes and Disaster Management

There are three groups, Group A, group B, & group C where group A is compulsory and consis of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

Unit I: Natural Catastrophes

Definition and types of natural Catastrophes such as earthquakes, floods, cyclones, and stromes, landslides, drought & famines, tsunami, and diseases epidemics etc. with examples.

Unit II: Disaster management

Pre disaster & Post Disaster Management; Risk Assessment; Role of administrator, Scientists, Planners, Volunteers, and community in disaster mitigation; Public awareness, drills and training, Forecasting, Warning systems including tsunami warning system; Disaster management in relation to earthquakes and floods.

DSE 4: Toxicology & Case Studies

There are three groups, Group A, group B, & group C where group A is compulsory and consis of Multiple choice type/ short answer/ true- false type questions. Out of the rest two groups , group B & group C , answer any three questions. Answering at least one question from each group.

Unit I TOXICOLOGY

- Definition, Branches
- Dose- Respose relationship graded , quantal.
- Different types of toxicants and their effects.
- Types of effects: physiological, behavioural, teratogenic, mutagenic, carcinogenic, effect at cellular level.
- Probit scale.
- Case Studies: Minamata Diseases, Etyi-Etyi

Suggested Readings:

1. A. K. De. (3rd Ed). 2008 Environmental Chemistry. New Age Publications India Ltd.
2. I. C. Shaw and J. Chadwick. 1997. Principles of Environmental Toxicology. Taylor& Francis Ltd.
3. S.C. Santra. 2011. Environmental Science. New Central Book Agency.
4. Ira. S. Richards. 2008. Principles and Practices of Toxicology in Public Health. Jones andBarlett Publications.

P 7: Air Pollution & Monitoring

- Calibration of High Volume Sampler
- Estimation of SO_x
- Estimation of NO_x
- Estimation of CO_x

P 8: Based on Industrial Training

Project development in coordination with environmental institution, agricultural institution, nearby industries, central industries and other NGO organizations. Students will required to provide an explicit presentation of their work which will be certified by concerned institution from which the training has been taken.