SCHOOL OF ENVIRONMENTAL SCIENCE
Dr. S.P.M. UNIVERSITY, RANCHI

Syllabus for B. Sc.(Hons.)
ENVIRONMENTAL SCIENCE BASED ON CBCS PATTERN
(Effective From Session 2018-21)

Distribution of Papers to various Semesters at a Glance Under CBCS : B.Sc. (Hons.) in Env. Sc.					
Semester-I	**Semester-II**	**Semester-II**	**Semester-IV**	**Semester-V**	**Semester-VI**
CC-1	**CC-3**	**CC-5**	**CC-8**	**CC-11**	**CC-13**
CC-2	**CC-4**	**CC-6**	**CC-9**	**CC-12**	**CC-14**
AECC-1 English Communication / MIL	***AECC-2 Environmental studies***	**CC-7**	**CC-10**	**DSE-1**	**DSE-3**
GE-1(Bot., Zool., Chem., Maths, Phys., Geol.)	**GE-2(Bot., Zool., Chem., Maths, Phys., Geol.)**	**SEC-1**	**SEC-2**	**DSE-2**	**DSE-4**
		GE- 3 (Bot., Zool., Chem., Maths, Phys., Geol.)	**GE-4 (Bot., Zool., Chem., Maths, Phys., Geol.)**		

Abbreviation:

CC = Core Course (Old Hons. Paper)
DSE = Discipline specific Elective Course (Old Special Paper)
AECC = Ability Enhancement Compulsory Course (Old Language & EVS Papers)
SEC = Skill Enhancement Elective Course
GE = General Elective (Old Subsidiary Paper)

Distribution of Credits, Marks & Pass Marks (1 credit in Theory Paper = 14 classes of 1 Hr. And 1 credit in Practical = 14 Classes of 2Hr. per Semester)						
		Credits	Full Marks	Mid Sem	End Sem	Pass Marks
Sem.- I	CC-1	4	75	15	60	30
	CC-2	4	75	15	60	30
	Core Pract-1	4	50		50	20
	GE-1	4	75		75	40
	GE-Pract.-1	2	25		25	10
	AECC	2	100/ 50+50		100/ 50+50	40/ 20+20
Sem. -II	CC-3	4	75	15	60	30
	CC-4	4	75	15	60	30
	Core Pract-2	4	50		50	20
	GE-2	4	75		75	40
	GE-Pract.-2	2	25		25	10
	EVS	2	100		100	40
Sem. -III	CC-5	4	75	15	60	30
	CC-6	4	75	15	60	30
	CC-7	4	75	15	60	30
	Core Pract-3	6	75		75	30
	SEC-1	1	75		75	30
	SEC Pract. 1	1	25		25	
	GE-3	4	75		75	40
	GE Pract-3	2	25		25	10
Sem.-IV	CC-8	4	75	15	60	30
	CC-9	4	75	15	60	30
	CC-10	4	75	15	60	30
	Core Pract-4	6	75		75	30
	SEC-2	1	75		75	30
	SEC Pract. 4	1	25		25	
	GE-3	4	75		75	40
	GE Pract-4	2	25		25	10
Sem.- V	CC-11	4	75	15	60	30
	CC-12	4	75	15	60	30
	DSE-1	4	75	15	60	30
	DSE-2	4	75	15	60	30
	Core Pract-5	8	100		100	40
Sem.-VI	CC-13	4	75	15	60	30
	CC-14	4	75	15	60	30
	DSE-3	4	75	15	60	30
	DSE-4	4	75	15	60	30
	Core Pract-6	8	100		100	40

B.Sc. Semester - I :Environmental Science Hons.

Core Course - I Full Marks 60 +15. Time:3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

FUNDAMENTALS OF ENVIRONMENTAL SCIENCE

UNIT I: THE BIOSPHERE (15)

- **History and scope of environmental science.**
- **Importance of Environmental science.**
- **Global Concept of: biosphere, biome, ecosystem.**
- **Subdivisions of the biosphere: lithosphere, atmosphere, hydrosphere.**
- **Impact of man on the biosphere: Environmental problems, (Global warming, Ozone depletion and Acid rain).**

UNIT II SYSTEM CONCEPT AND THE ECOSYSTEM (15)

- **Concepts pertaining to the ecosystem. Ecosystem organization: structural and functional.**
- **Concept of trophic levels, food chains, food web.**
- **Comparison of ecosystem through number, biomass and energy pyramids.**
- **Impact of man on ecosystems**
- **System concept, system analysis, system measurement.**
- **Concept of ecosystem dynamics; stability of ecosystems and control mechanisms: homeostasis, homeorhesis, microcosms and mesocosms.**

Internal assessment: 15 Marks

B.Sc. Semester - I :Environmental Science Hons.

Core Course - II Full Marks 60 +15. Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT I: ENVIRONMENTAL FACTORS (15)

Concept of environmental factors: maximum, minimum and optimum.

- Light
- Heat
- Carbon dioxide
- Oxygen

UNIT II: PRODUCTIVITY IN ECOSYSTEMS (15)

- Productivity in ecosystems; concept of gross production, net production, net ecosystem production; primary production, factors affecting primary production.
- Global primary productivity and its estimation.
- Secondary production, factors affecting secondary production; efficiency of production at various levels.
- Succession and changes in productivity.

Internal Assessment:15 Marks

B.Sc. Semester - I : Environmental Science Hons.

Core Practical-1 Full Marks:50 Time: 3 Hrs.

- Study of functioning and operations of important instruments and equipments: Thermometer, pH meter, Conductivity meter, Sampling bottle, Plankton net, Sedgewick rafter, Luxmeter. 5×3=15

- Analysis of common aquatic parameter: dissolved oxygen, free carbon dioxide, pH, Alkalinity. 10
- Analysis of common Soil parameter: oxygen, carbon dioxide, pH Alkalinity 10

- Practical Record 10

- Viva-voce 05

B.Sc. Semester - II : Environmental Science Hons.

Core Course – 3, Full Marks 60+15, Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT I: ENERGY FLOW THROUGH ECOSYSTEMS (15)

- **Concept of energy, energy reaching the earth, light as an energy carrier, energy transduction with respect to the laws of thermodynamics, concept of entropy and enthalpy, the ecosystem as a thermodynamic unit. Energy base for plants, photosynthesis, energy fixation and production. Energy flow through the food chain, the 10 percent law,**
- **Lindeman's trophic dynamic aspect.**
- **Energy flow models: Basic or universal model, Energy flow models of Aquatic ecosystems and Terrestrial Ecosystem, Comparison of energy flow in different ecosystems.**

UNIT II: BIOGEOCHEMICAL CYCLES (15)

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

Internal Assessment : 15

B.Sc. Semester - II : Environmental Science Hons.

Core Course – 4, Full Marks: 60+15, Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT I: COMMUNITY (15)

- **The community concept.**
- **Development of the community through succession.**
- **Community organization and stratification.**
- **Ecotone and ecotype and the niche concept:**
- **Concept of biogeography and Continental drift**

UNIT II STATISTICAL ANALYSIS OF ENVIRONMENTAL PARAMETERS (15)

- **Data structure and organization.**
- **Central tendencies: Mean, Median, Mode.**
- **Measures of Dispersion: standard deviation, Standard error, Variance, Correlation-regression.**
- **Test of significance: t-test, Chi-squared test, ANOVA.**
- **System modeling: analytical models, stochastic models.**
- **Data processing, Computer programming (basics).**

Internal assessment: 15

B.Sc. Semester - II :Environmental Science Hons.

Core Practical 2 **Full marks: 50** **Time 3 hrs**

- **Study of common soil and aquatic Biota** **15**
- **Frequency, density, Species area curve by the quadrat method.** **10**
- **Simple statistical analysis of data** **10**
- **Practical Record** **10**
- **Viva-voce** **05**

B.Sc. Semester - III :Environmental Science Hons.

Core Course - V Full Marks 60+15. Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT- I: BIOMES (15)

- **The Biome concept.**
- **Principal biomes of the world.**
- **Tropical forest biome.**
- **Temperate forest biome.**
- **Tundra biome.**
- **Desert biome.**
- **Grassland biome.**

UNIT II: POPULATION (15)

- **The population concept.**
- **Age structure and significance.**
- **Survivorship curves, demographic transition,**
- **Population growth rate, Pearl-Verhulst equation.**
- **Population regulation.**
- **Human Population and environmental impact; Population and its impact on resources.**

Internal assessment: 15

B.Sc. Semester - III :Environmental Science Hons.

Core Course - VI Full Marks 60+15. Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT I: CONCEPT OF NATURAL RESOURCES (15)

- **Natural Resources: concept of resources, types of resources.**
- **Water resources**
- **Land resources.**
- **Biological resources.**
- **Mineral resources.**

UNIT- II: CONSERVATION OF NATURAL RESOURCES (15)

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

Internal assessment: 15

B.Sc. Semester - III :Environmental Science Hons.

Core Course - VII Full Marks 60+15. Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT I: CONSERVATION OF BIODIVERSITY (15)

- **Biodiversity conservation: levels of biodiversity, types and distribution of biodiversity.**
- **Causes of biodiversity destruction.**
- **Need for conservation of biodiversity.**
- **Steps in the management and conservation of biodiversity, in-situ conservation, ex-situ conservation, inter-situ conservation.**

UNIT II: WILD LIFE MANAGEMENT (15)

- **Wildlife management.**
- **National parks, Biosphere reserves, Sanctuaries.**
- **Concept of various conservation projects implemented in India: Tiger project, Rhino project, Crocodile project.**
- **IUCN categories of threatened species.**

Internal assessment: 15

B.Sc. Semester - III :Environmental Science Hons.

Core Practical 3 **Full marks: 75** **Time 4 hrs**

1. Qualitative analysis of Phyto- and Zooplankton **15**

2. Quantitative estimation of plankton using a Sedgwick rafter **15**

3. Principle of working of a Spectrophotometer **15**
OR
Working principle of chromatograph

2. Practical Record **15**

3. Viva-voce **15**

B.Sc. Semester - III :Environmental Science Hons.

SEC- 1 Full Marks 75 Time: 3Hrs. Nos of lectures: 20

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 20 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis

UNIT-I Remote Sensing

- **Remote sensing: definition and principle. Electromagnetic Spectrum.**
- **Interaction of EMR with earth surface, Spectral signature.**
- **Satellite and sensor, Aerial photography and image Interpretation.**

UNIT-II Geographical Information System;

- **GIS: Definition and Components.**
- **Application and case study of remote sensing and GIS in geo-science: water resource management, land use planning, forest resource, agriculture, marine and atmospheric study.**

No Internal Assessment

B.Sc. Semester - III :Environmental Science Hons.

SEC Practical 1 Full Marks: 25 Time 3 hrs

Project work on the topics prescribed in the syllabus: 15

- **Water resource management**
- **Forest resource management**
- **Marine and atmospheric studies**

Presentation and viva 10

B.Sc. Semester - IV :Environmental Science Hons.

Core Course - VIII Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT I: FRESHWATER AND MARINE HABITAT (15)

- **Freshwater habitat: lotic and lentic habitats .**
- **Physical, Chemical and Biological characteristics of lotic & lentic habitats.**
- **Marine habitat: zonation, types of shores, deep sea adaptations.**

UNIT II: ESTUARIES AND SOIL HABITAT (15)

- **Estuaries: characteristics.**
- **A adaptations of organisms living in estuaries, Important estuaries in India.**
- **Soil: formation, profile, zonation.**
- **Classification and types of soils found in India.**
- **Physical, Chemical and Biological characteristics of various types of soil.**

Internal assessment: 15 Marks

B.Sc. Semester - IV :Environmental Science Hons.

Core Course - IX Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT I: WATER POLLUTION, AIR POLLUTION: (15)

- **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, sources, effects.**
- **Control of Air pollution.**

UNIT II: SOIL, SOUND, RADIATION POLLUTION: (15)

- **Soil pollution: definition, sources, types, effects and control.**
- **Sound pollution.**
- **Radiation pollution.**

Internal assessment: 15

B.Sc. Semester - IV :Environmental Science Hons.

Core Course - X Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT- I TOXICOLOGY (15)

- Definition, branches
- Dose-response relationship: graded, quantal.
- Different types of toxicants and their effects.
- Types of effects: physiological, behavioural, teratogenic, mutagenic, carcinogenic, effects at the cellular level.
- Probit scale.

UNIT- II EFFECT OF TOXICANTS AND ASSESMENT (15)

- Various types of interactions, Factor effecting toxicity
- Biotransformation of toxicants and Biodegradation
- Genotoxicology, Human Toxicology, Occupational safety and health administration.

Internal Assessment 15 Marks

B.Sc. Semester - IV :Environmental Science Hons.

Core Practical 4 **Full marks: 75** **Time 4 hrs**

- Measurement of chloride in water sample 10
- Determination of sulphate or phosphate in water sample 10
- Determination of SPM in the atmosphere 15
- Probit analysis 15
- Practical Record 10
- Viva-Voce 15

B.Sc. Semester - IV :Environmental Science Hons.

SEC- 2 Full Marks 75 Time: 3Hrs. Nos of lectures: 20

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 20 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

ENVIRONMENTAL IMPACT ASSESMENT AND RISK ASSESMENT (20)

Unit –I ENVIRONMENTAL IMPACT ASSESMENT (10)

- EIA – Definition, Introduction and concepts
- Scope and methodology of EIA.
- Life cycle assessment of EIA
- Introduction to ISO and ISO 14000.

UNIT –II –RISK ASSESMENT (10)

- Risk assessment: Introduction and scope, Project planning, Exposure assessment & toxicity assessment
- Hazard Identification and assessment
- Risk communication , Environmental monitoring, Community Evolvement, Legal and regulatory framework
- Human and ecological risk assessment.

No Internal Assessment

B.Sc. Semester - IV :Environmental Science Hons.

SEC Pract-2 Full Marks 25 Time: 3Hrs.

15

Project Report on Any one of the following or other topic:

- **EIA :Current issues in EIA,Case study of hydropower project\mines\thermal project**
- **Risk assessment: Environmental monitoring, Human and ecological risk assessment**

Presentation and viva **10**

B.Sc. Semester - V : Environmental Science Hons.

Core Course - XI Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT – I: Atmosphere & global Climate Change: (15)

- Introduction : Evolution and development of earth atmosphere, atmospheric structure and composition.
- Global Energy balance: earth energy balance, energy transfer in atmosphere, earth radiation budget, greenhouse gases, greenhouse effect.
- Ozone layer depletion:Importance of ozone layer, causes of ozone depletion.

UNIT-II:Global Warming and climate change:

- Role of Greenhouse gasses in climate change,.
- Atmospheric window, Impact o climate change on atmosphere,weather pattern,sea level rise.
- Climate change and policy:International agreement:Montreal Protocol,Kyoto Protocol,Convention on climate change,

Internal Assessment: 15 Mark

B.Sc. Semester - V :Environmental Science Hons.

Core Course - XII Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT-I: CONSERVATION OF WARTER RESOURCRS (15)

- Wetland and their management :Definition, types, ecological significance, threat to wetland.
- Wetland conservation and management: Ramsar convention and major wetland of India.
- Marine resource management: Marine resources, commercial use of marine resources.
- Threats to marine ecosystem and resources, Management of marine ecosystem and resorce management

UNIT II- ENVIRONMENTAL ISSUES OF INDIA (15)

- Introduction to Environmental issues of India.
- Silent valley project, Chipko Movement, Appiko movement.
- Narmada Bachao Andolan, Sardar Sarovar Project, Tehri Project.

Internal Assessment: 15 (Marks)

B.Sc. Semester - V : Environmental Science Hons.

DSE - 1 Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT- I: ENERGY RESOIURCE (15)

- Global energy resources : renewable and non-renewable resources.
- Distributon and availability of energy resources.
- Past , present , and future technology for capturing & integrating these resources into our energy infrastructure.
- Energy use scenario in rural and urban set up, energy conservation.

UNIT- II; ENERGY, ECOLLOGY & ENVIRONMENT (15)

- Energy production as driver of environmental changes.
- Energy production, transformation & utilization associated environmental impact.
- Energy over consumption & its impact on the environment, economy and global change.

Internal assessment 15 Marks

B.Sc. Semester - V : Environmental Science Hons

DSE - 2 Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT-I: Introduction to environmental economics

- Definition and scope of environmental economics, environmental economics verses traditional economics.
- Brief introduction to major components of economy: consumer,firm and their interaction in the market, producer and consumer surplus, market failure, law of demand and supply.
- Main characteristics of environmental goods, marginal analysis markets and market failure, social benefit, cost and welfare function, meaning and types of environmental values, majors of economic values.

UNIT-II: Natural resource economics

- Economics of non-renewable resources, economics of fuels and minerals
- Economics of renewable resources: Economics of water use, management of fisheries and forest
- Introduction to natural resource accounting
- Pollution control: policies for controlling air and water pollution, disposal of toxic and hazardous waste standard

Internal Assessment 15 Marks

B.Sc. Semester - V : Environmental Science Hons.

Core Practical 5 **Full marks: 100** **Time 4 hrs**

- Knowledge of the common environmental assessment equipments: Spectrophotometer, High volume air sampler, Conductivity meter, DO meter, Lux meter, BOD chamber 30
- Assessment of air pollutants in ambient air 20
- Make an assignment on : 20

  Natural Hazards: Earthquake, Tsunami, Flood, Drought, CycloneVolcanoes, Landslides, Coastal erosion, Coastal zone management; Landslide management.

  Anthropogenic Hazards: Bhopal gas tragedy, Chernobyl disaster, oil spills in aquatic system Deforestation hazards, Nuclear reactor hazards, or any such topic relevant topic of your choice.

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Sessional work 20

Viva-voce 10

B.Sc. Semester - VI :Environmental Science Hons.

Core Course - XIII Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT-I ENVIRONMENTAL POLICY OF INDIA (15)

- Forest management policy
- Water management policy
- Policy on environmental education and awareness.
- Policy on prevention of pollution and management.
- Policy on energy.

UNIT- II ENVIRONMENTAL ETHICS & ENVIRONMENTAL LAWS: (15)

- Introduction; The Earth summit
- Environmental ethics
- The Indian Wildlife (Protection) Act, 1972, amended 1993; No. 16 of 2003, [17/1/2003] - The Wild Life (Protection) Amendment Act, 2002; S.O.1085(E), [30/9/2002] ; The National Wildlife Action Plan. Forest (Conservation) Act, 1980, amended

- The Hazardous Wastes (Management and Handling) Amendment Rules, 2000;S.O.698(E), [17/6/2003] –
- Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003;
- The water (prevention and control of pollution) cess Act, 1977;The air (prevention and control of pollution) Act, 1981;S.O.123(E), [14/2/2000] –
- The environment (protection) Act, 1986;

Internal assessment: (15)

B.Sc. Semester - VI :Environmental Science Hons.

Core Course - XIV Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT I - ENVIRONMENTAL IMPACT ASSESSMENT (15)

- EIA: Introduction, need, preliminary proposal, public participation, formal proposal, screening, impact identification, scoping, impact forecasting, EIS statement, monitoring of environmental impacts.
- Life cycle assessment of EIA
- Introduction to ISO and ISO 14000.

UNIT –II –RISK ASSESMENT (15)

- Risk assessment:- Introduction and scope, Project planning, Exposure assessment & toxicity assessment
- Hazard Identification and assessment
- Risk communication , Environmental monitoring, Community Evolvement, Legal and regulatory framework
- Human and ecological risk assessment.

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Internal assessment: (15)

B.Sc. Semester - VI :Environmental Science Hons.

DSE - 3 Full Marks 60 Time: 3Hrs. Nos of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT- I: Natural and Anthropogenic hazards (15)

- Definition and types of natural catastrophes such as earthquakes, floods, cyclones and storms, landslides, drought and famines, tsunami, hurricanes and disease epidemics etc. with examples. Basic concepts of remote sensing

- Definition and types of anthropogenic hazards: impacts of anthropogenic activities, sand mining from river bank ,deforestation, mangrove destruction, nuclear reactors in hazard prone zones, case studies of Bhopal, Minamata disease Chernobyl disaster.

UNIT- II: Disaster Management: (15)

Pre disaster and post disaster management; Risk assessment; Role of administrators, 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.

Internal assessment: (15 Marks)

B.Sc. Semester - VI :Environmental Science Hons.

DSE - 4 Full Marks: 60 Time: 3Hrs. Nos. of lectures: 30

There shall be seven questions in total. Question no. 1 is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks with options etc and will carry 15 marks. From the rest 6 questions (3 from each unit carrying 15 marks) examinees will be required to answer three, selecting not more than two from any group. Number of lectures is in parenthesis.

UNIT-I: SOLID WASTE MANAGEMENT (15)

- **Introduction: sources** and generation of solid waste, their classification and chemical composition, characterization of municipal solid waste, hazardous and bio medical waste.
- **Impact of solid** waste on environment, human and plant health.
- **Effect of solid** waste and industrial effluent discharge on water quality and aquatic life.
- **M**ining waste and land degradation

UNIT II; INDUSTRIAL WASTE MANAGEMENT AND RESOUIRCE RECOVERY (15)

- Types of industrial waste :hazardous and non hazardous,
- Effect of industrial waste on air, water, soil.
- Industrial waste management and its importance.
- 4R-reduce,reuse,recycle and recover,
- Biological processing-composting, anaerobic digestion, aerobic treatment: mechanical & biological treatment, green Technique for waste treatment.

Internal assessment: (15) marks

B.Sc. Semester - VI :Environmental Science Hons.

Core Practical 6 Full marks: 100 Time 4 hrs

PROJECT (Based on special paper assignment)

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

- **Solid waste management**
- **Industrial waste management**
- **Bio-medical waste**
- **Sewage treatment plant**

The marks will be distributed as follows: 50 marks for the project report, 25 for written examination and 25 marks for viva-voce.

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