

SCHOOL OF ENVIRONMENTAL STUDIES

Dr. S. P. M. UNIVERSITY

RANCHI



Syllabus of B. Sc. (Honours)

**ENVIRONMENTAL SCIENCE BASED ON CBCS PATTERN
(Effective from Session 2018-21)**

**To be effective from session 2022 – 2025 after
moderation**

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[Signatures]

Distribution of Papers to various Semesters at a Glance Under CBCS:
B. Sc (Hons.) in Env. Science

Sem-I	Sem-II	Sem-III	Sem-IV	Sem-V	Sem-VI
CCU-101T	CCU-201T	CCU-301T	CCU-401T	CCU-501T	CCU-601T
CCU-102T	CCU-202T	CCU-302T	CCU-402T	CCU-502T	CCU-602T
AECC-1 English Communication / MIL	AECC-2 Environmental Studies	CCU-303T	CCU-403T	DSE-501T	DSE-601T
GEC-101T (Bot., Zool., Chem., Maths., Phys., Geol.)	GEC-201T (Bot., Zool., Chem., Maths., Phys., Geol.)	SEC-301T	SEC-401T	DSE-502T	DSE-602T
		GEC-301T (Bot., Zool., Chem., Maths., Phys., Geol.)	GEC-401T (Bot., Zool., Chem., Maths., Phys., Geol.)		

Abbreviation:

CCU	=	Core Course Under Graduate (Old Hons. Paper)
DSE	=	Discipline specific Elective Course (Old Special Paper)
AECC	=	Ability Enhancement Core Course (English Comm. / MIL & EVS)
SEC	=	Skill Enhancement Elective Course
GEC	=	General Elective Course (Old Subsidiary Paper)

Distribution of Credits, Marks & Pass Marks (1 credit in Theory Paper = 4 classes of 1 Hr. And 2 credits in Practical = 2 Classes of 2 Hrs. per Semester in a week; one SEM run for 15 weeks)

		Credits	Full Marks	Mid Sem	End Sem	Pass Marks
Sem.- I				15	60	30
	CCU-101T	4	75		25	10
	CCU-101P	2	25		60	30
	CCU-102T	4	75	15	25	10
	CCU-102P	2	25		75	30
	GEC-101T	4	75		25	10
	GEC-101P	2	25		100/ 50+50	40/ 20+20
	AECC-101T	2	100			
Sem. -II				15	60	30
	CCU-201T	4	75		25	10
	CCU-201P	2	25		60	30
	CCU-202T	4	75	15	25	10
	CCU-202P	2	25		75	30
	GEC-201T	4	75		25	10
	GEC-201P	2	25		100	40
	AECC-201T	2	100			
Sem.-III				15	60	30
	CCU-301T	4	75		25	10
	CCU-301P	2	25		60	30
	CCU-302T	4	75	15	25	10
	CCU-302P	2	25		60	30
	CCU-303T	4	75	15	25	10
	CCU-303P	2	25		75	30
	SEC-301T	4	75		25	10
	SEC-301P	2	25		75	30
	GEC-301T	4	75		25	10
	GEC-301P	2	25		60	30
				15	60	30
Sem.-IV					25	10
	CCU-401T	4	75		25	10
	CCU-401P	2	25		60	30
	CCU-402T	4	75	15	25	10
	CCU-402P	2	25		60	30
	CCU-403T	4	75	15	25	10
	CCU-403P	2	25		75	30
	SEC-401T	4	75		25	10
	SEC-401P	2	25		75	30
	GEC-401T	4	75		25	10
	GEC-401P	2	25		60	30
				15	60	30
Sem.-V					25	10
	CCU-501T	4	75		25	10
	CCU-501P	2	25		60	30
	CCU-502T	4	75	15	25	10
	CCU-502P	2	25		60	30
	DSE-501T	4	75	15		

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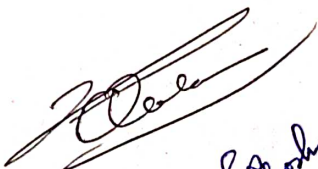


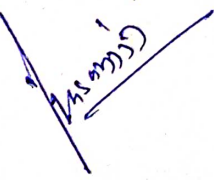


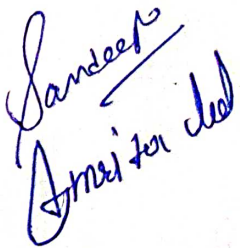
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	DSE-501P	2	25		25	10
	DSE-502T	4	75	15	60	30
	DSE-502P	2	25		25	10
Sem.-VI	CCU-601T	4	75	15	60	30
	CCU-601P	2	25		25	10
	CCU-602T	4	75	15	60	30
	CCU-602P	2	25		25	10
	DSE-601T	4	75	15	60	30
	DSE-601P	2	25		25	10
	DSE-602T	4	75	15	60	30
	DSE-602P	2	25		25	10

B. Sc. Environmental Science Hons.

Semester - I

CCU -101T: FUNDAMENTALS OF ENVIRONMENTAL SCIENCE & ECOSYSTEM

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

Nos. of lectures: 90 = (60+30)

UNIT I: THE BIOSPHERE

- History and scope of Environmental Science.
- Importance of Environmental Science.
- Concept of Biosphere, Biome, Ecosystem.
- Subdivisions of the Biosphere: Lithosphere, Atmosphere, Hydrosphere.
- Impact of Anthropogenic activities on the Biosphere: Environmental problems, (Global warming, Ozone depletion, Acid rain, Smog, and reduction in Carbon Sink).
- Climate Change, Desertification.

UNIT II SYSTEM CONCEPT AND THE ECOSYSTEM

- 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.
- Ecosystem stability and factor affecting stability
- 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

REFERENCE BOOKS FOR CCU-101T

1. **FUNDAMENTALS OF ENVIRONMENTAL STUDIES** by MAHUA BASU – Cambridge University Press.
2. **ENVIRONMENTAL SCIENCE** by Y. K. SINGH New Age Int. Publishers
3. **ECOLOGY AND ENVIRONMENT** by P.D. SHARMA – Rastogi Publication
4. **FUNDATMENTALS OF ECOLOGY AND ENVIRONMENT** by PRANAV KUMAR – Pathfinder Publication.
5. **PRINCIPLE OF ENVIRONMENTAL SCIENCE** by CONIGHUM - TATA McGraw Hills
6. **FUNDAMENTAL OF ECOLOGY** by E. ODUM, RIENHERT & WINSTON, New York Publications.
7. **FUNDAMENTAL OF ENVIRONMENTAL BIOLOGY** by B. MUKHERJEE, Silverline Publication, Allahabad.
8. **BIOGEOGRAPHY BY SAVINDRA SINGH.** - Ravilka Pub.
9. **OCEANOGRAPHY A BRIEF INTRODUCTION BY K SIDHARTHA** - Kitab Mahal
10. **HANDBOOK OF LIMNOLOGY AND WATER POLLUTION BY S.M. DAS.** -South Asian Publisher, New Delhi.
11. **POPULATION ECOLOGY BY BEGON, M. AND MORTIMER.** - Blackwell Scientific Publication, London
12. **ECOLOGY OF FRESHWATER BY B. MOSS.** - Blackwell, Oxford

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Aneel

Soni

Shah

Sandeep
Shruti

B. Sc. Environmental Science Hons.

Semester – I

CCU-102T: ENVIRONMENTAL FACTORS & PRODUCTIVITY

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15=75

Exam Duration: 2.5 Hrs.

Nos. of lectures: 90 = (60+30)

UNIT I: ENVIRONMENTAL FACTORS

Concept of environmental factors: maximum, minimum and optimum.

- Light
- Heat
- Carbon dioxide
- Oxygen
- Humidity
- Pressure
- Wind Velocity
- Pressure Belt
- Soil

UNIT II: PRODUCTIVITY IN ECOSYSTEMS

- 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

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B.Sc. Environmental Science Hons.

Semester – I

CCU- (101P + 102P):

PRACTIAL

Full Marks 60+15 = 75

Exam Duration: 3 Hrs.

- Study of functioning and operations of important instruments and equipment: 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

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Anshul
Soni
Ravi
Sandeep
Anshika

B.Sc. Environmental Science Hons.

Semester - II

CCU-201T: ENERGY FLOW & ROCKS & MINERALS

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15=75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

UNIT I: ENERGY FLOW THROUGH ECOSYSTEMS

- 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: ROCKS AND MINERALS, BIOGEOCHEMICAL CYCLES

- Concepts of Rocks and Minerals: Minerals and important rock forming minerals; Rock Cycle: Lithification and Metamorphism; Rock structure, Igneous, Sedimentary and Metamorphic Rocks; weathering: physical, biogeochemical processes; erosion: physical processes of erosion, factors affecting erosion; agents of erosion: rivers and streams, glacial and Aeolian transportation and deposition of sediments by running water, wind and glaciers.
- Concepts of biogeochemical cycle, Role of decomposers, Importance of Biogeochemical Cycle, Water cycle, Carbon cycle, Nitrogen cycle, Phosphorus cycle, Sulphur cycle.
- Impact of man on biogeochemical cycles

Internal Assessment: 15 Marks

9

REFERENCE BOOKS FOR CCU-201T

8. **FUNDAMENTALS OF ENVIRONMENTAL STUDIES** by MAHUA BASU – Cambridge University Press.
9. **ENVIRONMENTAL SCIENCE** by Y. K. SINGH New Age Int. Publishers
10. **ECOLOGY AND ENVIRONMENT** by P.D. SHARMA – Rastogi Publication
11. **FUNDATMENTALS OF ECOLOGY AND ENVIRONMENT** by PRANAV KUMAR – Pathfinder Publication.
12. **PRINCIPLE OF ENVIRONMENTAL SCIENCE** By CONIGHUM - - TATA McGraw Hills
13. **FUNDAMENTAL OF ECOLOGY** by E. ODUM - Rienhart & Winston, New York.
14. **FUNDAMENTAL OF ENVIRONMENTAL BIOLOGY** by B. MUKHERJEE - Silverline Publication, Allahabad.

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Anshu
Sandeep
Amrita dal
Soni
Shah
Pramila

Semester - II

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

No. of lectures: 90 = (60+30)

- The community concepts.
- Development of the community through succession.
- Community organization and stratification.
- Ecotone and Ecotype and the Niche Concept
- Concept of biogeography and Continental drift

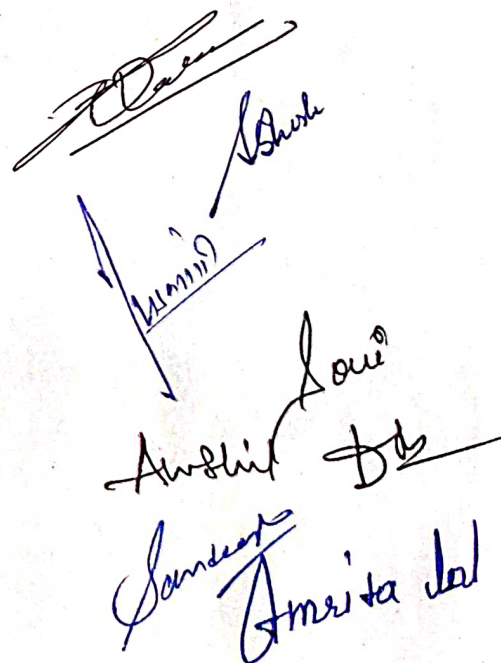
- Data structure and organization.
- Central tendency: Mean, Median, Mode.
- Measures of Dispersion: Standard Deviation, Standard error, Variance, Correlation-Regression.
- Test of significance: t-test, Chi-squared test, ANOVA.
- System Modeling: Analytical Models, Stochastic Models.
- Data Processing, Computer Programming (Basics).

Calvin
 Sarah
 Allison
 Andrew
 David
 Isaac
 Jacob
 Joseph
 John
 Luke
 Mark
 Matthew
 Michael
 Paul
 Peter
 Richard
 Robert
 Thomas
 Timothy
 William
 Zachary

REFERENCE BOOKS FOR CCU-202T:

1. ENVIRONMENTAL MICROBIOLOGY BY P.D SHARMA – Rastogi Pub.
2. FUNDAMENTALS OF BIOSTATISTICS BY P HANMANATH RAO & K JANARDAN - Wiley Pub.
3. PRINCIPLES AND PRACTICE OF SOIL SCIENCE. THE SOIL AS A NATURAL RESOURCE, BY ROBERT E WHITE - Wiley Pub.
4. BIOSTATISTIC BY VEERBALA RASTOGI – Medtech Pub.
5. BIOSTATISTICS BY KHAN AND KHANAM – Ukaaz Pub.
6. BIOSTATISTICS BY SADGHURU PRASAD - Rastogi Pub.
7. MICROBIAL BIOLOGY BY R. M. ATLAS & BARTHA – Wiley-Blackwell Pub.
8. DYNAMICS OF ENVIRONMENTAL BIOPROCESSES BY MODELING AND SIMULATION-Snape & Dune Publication
9. BIOSTATISTICAL ANALYSIS J. H. ZAR - Pearson
10. ENVIRONMENTAL BIOLOGY IN REFERENCE TO INDIA BY B. MUKHERJEE - Silverline Publication, Allahabad
11. FUNDAMENTALS OF ENVIRONMENTAL BIOLOGY BY B. MUKHERJEE - Silverline Publication, Allahabad

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B.Sc. Environmental Science Hons.

Semester - II

CCU- (201P + 202P):

PRACTIAL

Full Marks 25+25=50

Exam Duration: 3 Hrs.

- | | |
|---|----|
| • Study of common soil Texture. | 10 |
| • Study of aquatic Biota | 10 |
| • Frequency, Density, Species Area Curve by the Quadrat Method. | |

OR

10

- | | |
|--|----|
| • Simple Statistical Analysis of Data
(Measures of Central Tendencies, Measures of Dispersion, Chi-Square & T-test) | |
| • Practical Record | 10 |
| • Viva-Voce | 10 |

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 Aramis
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 Janssen
 Jemita del

B.Sc. Environmental Science Hons.

Semester - III

CCU-301T: BIOME AND POPULATION

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

UNIT- I: BIOMES

- The Biome Concepts.
- Principal Biomes of the India and World.
- Tropical Forest Biome, Temperate Forest Biome, Tundra Biome, Desert Biome, Grassland Biome, Alpine Biome

UNIT II: POPULATION

- The population Concepts.
- 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 marks

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REFERENCE BOOKS FOR CCU - 301T

1. **FUNDAMENTALS OF ENVIRONMENTAL STUDIES** by MAHUA BASU - Cambridge University Press
2. **ENVIRONMENTAL SCIENCE** by Y.K. SINGH - New Age Int. Publishers
3. **ECOLOGY AND ENVIRONMENT** by P.D. SHARMA - Rastogi Publication
4. **FUNDATMENTALS OF ECOLOGY AND ENVIRONMENT** by PRANAV KUMAR - Pathfinder Publication.
5. **PRINCIPLE OF ENVIRONMENTAL SCIENCE** by CONIGHUM - Tata McGraw Hills
6. **FUNDAMENTAL OF ECOLOGY** by E. ODUM - Rienhert & Winston Pub.
7. **FUNDAMENTAL OF ENVIRONMENTAL BIOLOGY** by B. MUKHERJEE - Silverline Publication, Allahabad
8. **BIOGEOGRAPHY** BY SAVINDRA SINGH – Pravalika Pub.
9. **OCEANOGRAPHY A BRIEF INTRODUCTION** BY K SIDHARTHA- Kitab Mahal
10. **HANDBOOK OF LIMNOLOGY AND WATER POLLUTION** BY S.M. DAS, South Asian Publisher, New Delhi
11. **POPULATION ECOLOGY** BY BEGON, M. AND MORTIMER - Blackwell Scientific Publication, London.
12. **ECOLOGY OF FRESHWATER** BY B. MOSS – Blackwell & Oxford Pub.

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Ravi
Shah
Anshu
Jai
Sauri
Sandeep
Anshita

B.Sc. Environmental Science Hons.

Semester - III

CCU-302T: NATURAL RESOURCES & CONSERVATION

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

UNIT I: CONCEPT OF NATURAL RESOURCES

- Natural Resources: Renewable and Non- Renewable.
- Water Resources
- Land Resources.
- Biological Resources.
- Mineral Resources.
- Energy Resources: Conventional and Non- Conventional.

UNIT- II: CONSERVATION OF NATURAL RESOURCES

- 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

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REFERENCE BOOKS FOR CCU-302T

1. NON-CONVENTIONAL ENERGY RESOURCE by D. S. CHAUHAN & S. K. SHRIVASTAVA- New Age International Publishers
2. ENVIRONMENTAL LAW IN INDIA by P LEELA KRISHNAN - Lexis Nexis Pub
3. ENVIRONMENTAL LAW by DR. S. C. TRIPATHI - Central Law Publication.
4. PRINCIPLES AND PRACTICE OF SOIL SCIENCE. THE SOIL AS A NATURAL RESOURCE by ROBERT E. WHITE - Wiley Pub.
5. ENVIRONMENTAL SCIENCE FUNDAMENTALS ETHICS AND LAWS by ASHISH SHUKLA, RENU SINGH & ANIL KUMAR- WILEY Pub.
6. NATURAL RESOURCES CONSERVATION by OLIVER S OWEN & CHIRAS - Pearson
7. ECOLOGY OF NATURAL RESOURCES by RAMADE – Wiley & Blackwell Pub.

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Ravi
Ashish
Anshul
Sanjeev
Amrita
Sauri

B.Sc. Environmental Science Hons.

Semester - III

CCU-303T: BIODIVERSITY CONSERVATION & WILDLIFE MANAGEMENT

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

UNIT I: CONSERVATION OF BIODIVERSITY

- Biodiversity Conservation: Levels of Biodiversity
- Types and Distribution of Biodiversity.
- Causes of Biodiversity Loss.
- 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

- 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

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Aushil
Dheer
Anshu
Sandeep
Soni
Anurita dal

REFERENCE BOOKS FOR CCU-303T

1. ENVIRONMENTAL MANAGEMENT TEXT AND CASES BY BALA KRISHNAMOORTHY – PHI Publication.
2. NATURAL RESOURCES CONSERVATION OLIVER S. OWEN & CHIRAS – Pearson Pub.
3. ECOLOGY OF NATURAL RESOURCES BY RAMADE – Wiley & Blackwell Pub.
4. WATER POLLUTION BIOLOGY BY P. D. ABEL - John Wiley and Sons Pub.
5. FUNDAMENTALS OF ENVIRONMENTAL SCIENCES B. MUKHERJEE, Silverline Publication, Allahabad.
6. ECOLOGY OF FRESH WATER BY B. MOSS – Blackwell Pub.
7. INTRODUCTION TO FRESH WATER ALGAE BY A. PENTECOST- Richmond Pub.
8. ELEMENTS OF MARINE ECOLOGY BY R. V. TAIT – Butterworth Pub.

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R. C. Chandra
Shobh
Anshul
Saur
Sandeep
Anita del

B.Sc. Environmental Science Hons.

Semester – III

CCU- (301P + 302P + 303P):

PRACTICAL

Full marks: (25+25+25) = 75

Time-3 hrs.

1. Qualitative Analysis of Phyto- and Zooplankton
2. Quantitative Estimation of Plankton Using a Sedgwick Rafter
3. Principle of Working of a Spectrophotometer

15

15

15

OR

4. Working Principle of Chromatograph

5. Practical Record

15

6. Viva-Voce

15

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B. Sc. Environmental Science Hons.

Semester – III

SEC- 301T: REMOTE SENSING & GIS

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

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

~~Ravi~~

Sachin

Anshul

Ish

Sandeep

Amita Lal

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REFERENCE BOOKS FOR SCE-301T:

1. REMOTE SENSING PRINCIPLES AND APPLICATIONS BY DR. B. C. PANDA – Viva Book Pub.
2. BASICS OF REMOTE SENSING AND GIS BY DR. S. KUMAR – Laxmi Pub.
3. ENVIRONMENTAL GEOGRAPHY BY SAVINDRA SINGH - Pravalika Pub.
4. A TEXT BOOK OF ENVIRONMENTAL CHEMISTRY AND POLLUTION CONTROL BY DR. S. S. DARA & DR. D. D. MISHRA - S. Chand Pub.
5. INTRODUCTION TO ENVIRONMENTAL REMOTE SENSING BY CURTIS -CRC Press.
6. ENVIRONMENTAL BIOTECHNOLOGY BY S. N. JOGDANEL - CBS Pub.
7. ENVIRONMENTAL GEOLOGY BY EDWARD BY A. KELLER - John Wiley and Sons Pub.
8. AIR POLLUTION AND CONTROL BY K. V. S. G. MURLIKRISHNAN – Laxmi Publication.
9. REMOTE SENSING AND GIS BY V. MADHAVAN RAO – Oxford University Press.
10. ENVIRONMENTAL BIOTECHNOLOGY BY P. K. MOHAPATRA - Wiley Pub.
11. ENVIRONMENTAL BIOTECHNOLOGY BY ALLEN K - CBS Pub.

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Anshul
Shubh
Sandeep
Amrita

B. Sc. Environmental Science Hons.

Semester – III

SEC-301P:

PRACTICAL

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
- Relevant topic from the syllabus
- Presentation and Viva

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Amelia
Dh
Sandeep
Amrita dal

B. Sc. Environmental Science Hons.

Semester – IV

CCU-401T: FRESHWATER, MARINEWATER, ESTUARIES & SOIL HABITAT

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

Unit I: Freshwater and Marine Habitat

- 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

- Estuaries: Characteristics.
- 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

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REFERENCE BOOKS FOR CCU-401T:

1. ENVIRONMENTAL MANAGEMENT TEXT AND CASES BY BALA KRISHNAMOORTHY – PHI publication
2. NATURAL RESOURCES CONSERVATION OLIVER S. OWEN & CHIRAS – Pearson Pub.
3. ECOLOGY OF NATURAL RESOURCES BY RAMADE – Wiley Pub.
4. WATER POLLUTION BIOLOGY BY P. D. ABEL - John Wiley and Sons Pub.
5. FUNDAMENTALS OF ENVIRONMENTAL SCIENCES B. MUKHERJEE - Silverline Publication, Allahabad
6. ECOLOGY OF FRESH WATER BY B. MOSS – Blackwell Pub.
7. INTRODUCTION TO FRESH WATER ALGAE BY A. PENTECOST- Richmond Pub.
8. ELEMENTS OF MARINE ECOLOGY BY R. V. TAIT - Butterworth Pub.

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Anshul
Dhs
Sauri
Santosh
Smriti Jee

B. Sc. Environmental Science Hons.

Semester – IV

CCU-402T: WATER, AIR, SOIL, SOUND & RADIATION POLLUTION

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15= 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

Unit I: Water Pollution, Air Pollution

- Concept Of Pollution: Types of Pollutants, Its 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, Control and Treatment.
- Eutrophication.
- Air Pollution: Definition, Ambient Standards, Sources, Effects.
- Control of Air Pollution.

Unit II: Soil, Sound, Radiation Pollution

- Soil Pollution: Definition, Sources, Types, Effects and Control.
- Sound Pollution: Definition, Sources, Effects and Control.
- Radiation Pollution: Definition, Sources, Effects and Control.

Internal Assessment: 15

REFERENCE BOOKS FOR CCU-402T

1. ENVIRONMENTAL MANAGEMENT TEXT AND CASES BY BALA RISHNAMOORTHY
– PHI Publication.
2. A TEXT BOOK OF ENVIRONMENTAL CHEMISTRY AND POLLUTION CONTROL BY
DR. S. DARA & DR. D. D. MISHRA - S. Chand Pub.
3. CLIMATOLOGY BY D. S. LAL – Sharda Pustak Bhawan Pub.
4. WATER POLLUTION BIOLOGY BY P.D. ABEL- John Wiley and Sons Pub.
5. FUNDAMENTALS OF ENVIRONMENTAL SCIENCES B. MUKHERJEE - Silverline
Publication, Allahabad
6. CLIMATOLOGY BY SAVINDRA SINGH – Pravalika Pub.
7. FUNDAMENTAL OF ENVIRONMENTAL ENGINEERING BY MASTERS & GILBERTS
8. GLOBAL ENVIRONMENTAL CHANGE BY A. N. MANNION - Longman Pub.
9. AIR POLLUTION BY M. N. RAO & H. V. N. RAO – McGraw & Hills Pub.
10. ENVIRONMENTAL POLLUTION CONTROL ENGHINNERING BY C. S. RAO - New Age
International Pub.
11. WATER POLLUTION BY P. K. GOEL- New Age International Pub.

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[Handwritten signatures and initials in blue ink:]
Ravi
Shubh
Anshul
Dhruv
Sandeep
Amrita Dal
Soni

B. Sc. Environmental Science Honors

Semester – IV

CCU-403T: TOXICOLOGY, EFFECTS OF TXICANTS & ASSESSMENT

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

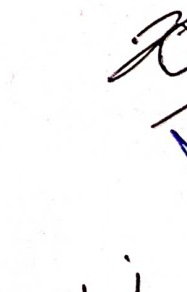
Unit- I Toxicology

- Definition, Branches
- Dose-Response Relationship: Graded, Quantal.
- Different Types of Toxicants and their Effects.
- Types of Effects: Physiological, Behavioral, Teratogenic, Mutagenic, Carcinogenic, Effects at the Cellular Level.
- Probit Scale.

Unit- II Effect of Toxicants and Assessment

- Various Interactions Among Toxicants, Factor Effecting Toxicity
- Biotransformation of Toxicants and Biodegradation
- Geno-Toxicology, Human Toxicology, Occupational Safety and Health Management.

Internal Assessment-15 Marks



 Anshu Dhar
 Sandeep
 Amrita Lal

REFERENCE BOOKS FOR CCU- 403T

1. ENVIRONMENTAL TOXICOLOGY BY P. D. SHARMA - Rastogi Publication.
2. ENVIRONMENTAL TOXICOLOGY SRUJANA KATHI – Nation Press.
3. A TEXT BOOK OF MODERN TOXICOLOGY ERNEST HODGSON – Wiley Pub.
4. TOXICOLOGY BY S. V. S. RANA- Narosa Publication.
5. ENVIRONMENTAL BIOLOGY AND TOXICOLOGY BY B. MUKHERJEE,
Silverline Publication, Allahabad

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Arun
Sushant
Vishal
Anushil
Sandeep
Amrita
Saro

B. Sc. Environmental Science Hons.

Semester – IV

CCU- (401P + 402P + 403P):

PRACTICAL

Full marks: (25+25+25) = 75

Time: 3 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 |

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B.Sc. Environmental Science Hons.

Semester – IV

SEC-401T: EIA & RISK ASSESSMENT

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

Unit –I: Environmental Impact Assessment

- EIA – Definition, Introduction and Concepts
- Scope and Methodology of EIA.
- Life Cycle Assessment of EIA
- Introduction to ISO and ISO 14000.

Unit –II: Risk Assessment

- Risk Assessment: Introduction and Scope, Project Planning, Exposure Assessment & Toxicity Assessment
- Hazard Identification and Assessment
- Risk Communication, Environmental Monitoring, Community Evolvment, Legal and Regulatory Framework
- Human and Ecological Risk Assessment.

No Internal Assessment

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Shreshth
Anushil
Sandeep
Smriti dal
Shoh
Jai

REFERENCE BOOKS FOR SEC-401T

1. ENVIRONMENTAL IMPACT ASSESSMENT by N. S. RANA - S. Chand Pub.
2. ENVIRONMENTAL LAW AND INTRODUCTION by NAWNEET VIBHAW JUSTICE & SWATANTER KUMAR - Lexis Nexis Pub.
3. ENVIRONMENTAL IMPACT ASSESSMENT by N. S. RAMAN, A. R. GAJBHIYE & S. R. KHANDESHWAR – Wiley Pub.
4. ENVIRONMENTAL LAW IN INDIA by P LEELA KRISHNAN - Lexis Nexis Pub.
5. ENVIRONMENTAL LAW by DR. S. C. TRIPATHI - Central Law Pub.
6. ENVIRONMENTAL SCIENCE FUNDAMENTALS ETHICS AND LAWS by ASHISH SHUKLA, RENU SINGH & ANIL KUMAR - Wiley Pub.

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Rana
Schub
Hemant
Anshul
Shukla
Sandeep
Amrita

B. Sc. Environmental Science Hons.

Semester – IV

SEC- 401P:

PRACTICAL

Full Marks: 25

Time: 3 hrs.

Project work on the topics prescribed in the syllabus:

15

- EIA: Current issues in EIA
- Case Study of Hydropower Plants/ Projects/ Mines/ Thermal Projects
- Risk Assessment
- Environmental Monitoring
- Human and Ecological Risk Assessment
- Presentation and Viva

10

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B.Sc. Environmental Science Hons.

Semester – V

CCU-501T: ATMOSPHERE, GLOBAL WARMING & CLIMATE CHANGE

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

UNIT – I: Atmosphere & Global Climate Change

- Introduction: Evolution and Development of Earth Atmosphere, Atmospheric Structure and Composition.
- Global Energy Balance: Earth's Energy Balance, Energy Transfer in Atmosphere, Earth's 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 of Climate Change on Atmosphere, Weather Pattern, Sea Level Rise.
- Climate Change and Policy: International Agreement on Montreal Protocol, Kyoto Protocol, Convention on Climate Change,

Internal Assessment: 15 Mark

Devi
Shobh
Anshu
Shubh
Sandeep
Amrita dal

REFERENCE BOOKS FOR CCU-501T:

1. ENVIRONMENTAL SCIENCE by Y.K. SINGH - New Age International Pub.
2. THE ATMOSPHERE AN INTRODUCTION TO METEOROLOGY BY FREDRICK K LUTGENS, EDWARD JTA RUBCK & DENNIS TASA – Pearson Pub.
3. A TEXT BOOK OF ENVIRONMENTAL CHEMISTRY AND POLLUTION CONTROL BY DR. SS DARA & DR. D.D. MISHRA - S. Chand Pub.
4. CHEMISTRY FOR ENVIRONMENTAL ENGINEERING AND SCIENCE BY SAWYER MC CARTY PARKN - McGraw Hill Pub.
5. FUNDAMENTAL OF ENVIRONMENTAL BIOLOGY by B. MUKHERJEE, Silverline Publication, Allahabad.
6. FUNDAMENTAL ENVIRONMENTAL ENGINEERING BY MASTERS & GILBERTS - Pearson Pub.

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Ravi
Sahni
Anshul
Soni
Sandeep
Amrita Lal

B.Sc. Environmental Science Hons.

Semester – V

CCU-502T: CONSERVATION OF WATER & ENVIRONMENTAL ISSUES

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

Unit-I: Conservation of Water Resources

- Wetland and their Management: Definition, Types, Ecological Significance, Threat to Wetland.
- Wetland Conservation and Management: Ramsar Convention and Major Wetlands of India.
- Marine Resource Management: Marine Resources, Commercial use of Marine Resources.
- Threats to Marine Ecosystem and Resources, Management of Marine Ecosystem and Resource Management

Unit-II: Environmental Issues of India

- 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)

[Handwritten signatures and initials]
Anshul, Bh, Sandeep, Amrita dal, Jav, Shobh

REFERENCE BOOKS FOR CCU-502T

1. NATURAL RESOURCES CONSERVATION OLIVER S. OWEN & CHIRAS - Pearson Pub.
2. FUNDAMENTALS OF ENVIRONMENTAL SCIENCES B. MUKHERJEE, Silverline Publication, Allahabad.
3. ECOLOGY OF FRESH WATER BY B. MOSS - Blackwell Pub.
4. INTRODUCTION TO FRESH WATER ALGAE BY A. PENTECOST - Richmond Pub.
5. ELEMENTS OF MARINE ECOLOGY BY R. V. TAIT - Butterworth Pub.

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Ravi
Shobh
Anshul
Dhanu
Sandeep
Amrita

B.Sc. Environmental Science Hons.

Semester – V

DSE – 501T: ENERGY RESOURCES, ECOLOGY & ENVIRONMENT

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

Unit- I: Energy Resources

- Global Energy Resources: Renewable and Non-Renewable Resources.
- Distribution 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, Ecology & Environment

- 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

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Anshul
Shubh
Sandeep
Amita Lal

REFERENCE BOOKS FOR DSE - 501T

1. NATURAL RESOURCES CONSERVATION OLIVER S. OWEN & CHIRAS-
Pearson Pub.
2. ECOLOGY OF NATURAL RESOURCES BY RAMADE
3. FUNDAMENTALS OF ENVIRONMENTAL SCIENCES B. MUKHERJEE,
Silverline Publication, Allahabad.
4. NON-CONVENTIONAL ENERGY RESOURCE by D. S. CHAUHAN & S. K.
SHRIVASTAVA - New Age International Pub.
5. ECOLOGY OF NATURAL RESOURCES by RAMADE – Wiley Publication
6. THE ECOLOGY OF NATURAL RESOURCES by SIMMONS - Edward Arnold Pub.

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Anshul
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Sandeep
Amrita dal

B.Sc. Environmental Science Hons.

Semester – V

DSE – 502T: ENVIRONMENTAL & NATURAL RESOURCE ECONOMICS

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

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

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Anshul

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Sankeer

Amrita Jal

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Soni

REFERENCE BOOKS FOR DSE-502T

1. NATURAL RESOURCES CONSERVATION OLIVER S. OWEN & CHIRAS – Pearson Pub.
2. ECOLOGY OF NATURAL RESOURCES BY RAMADE
3. FUNDAMENTALS OF ENVIRONMENTAL SCIENCES B. MUKHERJEE, SILVERLINE PUBLICATION, ALLAHABAD.
4. NON-CONVENTIONAL ENERGY RESOURCE by D. S. CHAUHAN & S. K. SHRIVASTAVA - New Age International Pub.
5. ECOLOGY OF NATURAL RESOURCES by RAMADE
6. THE ECOLOGY OF NATURAL RESOURCES by SIMMONS- Edward Arnold Pub.
7. ENVIRONMENTAL ECONOMICS BY N. MANI – New Century Pub.

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Shah
Anshul
Dhruv
Gandeep
Amita Lal
Soni

B.Sc. Environmental Science Hons.

Semester – V

CCU- (501P + 502P) + DSE- (501P + 502P): PRACTICAL

Full marks: 100

Time- 3 hrs.

- Knowledge of the Common Environmental Assessment Equipment's: 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, Cyclone Volcanoes, 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 of your Choice.

Sessional Work 20

Viva-Voce 10

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B.Sc. Environmental Science Hons.

Semester – VI

CCU-601T: ENVIRONMENTAL POLICY, ETHICS & LAWS

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

UNIT-I ENVIRONMENTAL POLICY OF INDIA

- Forest management policy
- Water management policy
- Policy on environmental education and awareness.
- Policy on prevention of pollution and management.
- Policy on energy.
- National green tribunal (NGT)

UNIT- II: ENVIRONMENTAL ETHICS & LAWS (With reference to latest laws, rules and notifications)

- 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;
- Solid waste management rules 2016
- E-waste management rules-2016.
- The construction and demolition waste management rules 2016.
- Noise pollution rules 2000.

Internal assessment: (15)

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Anshul
Dhruv
Sandeep
Amrita dal
Soni
Soni
Soni

REFERENCE BOOKS FOR CCU-601T:

1. ENVIRONMENTAL IMPACT ASSESSMENT by N. S. RANAH - Wiley Pub.
2. ENVIRONMENTAL LAW AND INTRODUCTION by NAWNEET VIBHAW JUSTICE & SWATANTER KUMAR - Lexis Nexis Pub.
3. ENVIRONMENTAL IMPACT ASSESSMENT by N. S. RAMAN, A. R. GAJBHIYE & S. R. KHANDESHWAR - Wiley Pub.
4. NON-CONVENTIONAL ENERGY RESOURCE by D. S. CHAUHAN & S. K. SHRIVASTAVA - New Age International Pub.
5. ENVIRONMENTAL LAW IN INDIA by P LEELA KRISHNAN - Lexis Nexis Pub.
6. ENVIRONMENTAL LAW by DR. S. C. TRIPATHI - Central Law Pub.
7. PRINCIPLES AND PRACTICE OF SOIL SCIENCE. THE SOIL AS A NATURAL RESOURCE by ROBERT E. WHITE - Wiley Pub.
8. ENVIRONMENTAL SCIENCE FUNDAMENTALS ETHICS AND LAWS by ASHISH SHUKLA, RENU SINGH & ANIL KUMAR- Wiley Pub.
9. NATURAL RESOURCES CONSERVATION by OLIVER S OWEN & CHIRAS – Pearson Pub.
10. ECOLOGY OF NATURAL RESOURCES by RAMADE
11. THE ECOLOGY OF NATURAL RESOURCES by SIMMONS - Edward Arnold Pub.

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Anushil
Isha
Sandeep
Amrita
Soni

B.Sc. Environmental Science Hons.

Semester – VI

CCU-602T: GREEN TECHNOLOGY, GENDER RESOURCES & ENVIRONMENT

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

UNIT I – Green technology & Environment

- Definition & concepts: green technology, green energy, green infrastructure, green economy & green chemistry.
- Green technologies in historical & contemporary perspective successful green technologies, wind turbines, Solar panels. 3 Rs of green technology, Reuse, Recycle & Reduce.
- Agenda of green development: reduction of ecological foot print, role of green technologies towards a sustainable future, major challenges & their resolution for implementation of green technologies, Role of advancement in science in developing environment friendly technologies

UNIT –II –Gender, Resources & Environment

- Knowledge about the environment among men & woman, differential dependencies on environmental resources, implications of gendered responses to environmental degradation.
- Woman participation in environmental movements & conservation: historical & contemporary case studies: role of woman in environmental education, awareness & sustainable development.
- Need for gender equity: instruments for change education media, action groups, policy & management: equity in resource availability & consumption for sustainable future

Internal assessment: (15)

REFERENCE BOOKS FOR CCU - 602T

1. **NATURAL RESOURCES CONSERVATION OLIVER S. OWEN & CHIRAS - Pearson Pub.**
2. **ECOLOGY OF NATURAL RESOURCES BY RAMADE – Pearson Pub.**
3. **FUNDAMENTALS OF ENVIRONMENTAL SCIENCES B. MUKHERJEE, Silverline Publication, Allahabad.**
4. **NON-CONVENTIONAL ENERGY RESOURCE by D. S. CHAUHAN & S. K. SHRIVASTAVA - New Age International Pub.**
5. **THE ECOLOGY OF NATURAL RESOURCES by SIMMONS - Edward Arnold Pub.**
6. **RENEWABLE ENERGY & GREEN TECHNOLOGY BY ANJAN KUMAR SAHOO AND DR. S. P. NANDA – Notion Press.**

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Shah
Munir
Soni
Amish
Hem
Sandeep
Amrita Lal

B.Sc. Environmental Science Hons.

Semester – VI

DSE – 601T: HARAZARDS & DISASTER MANAGEMENT

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

UNIT- I: Natural and Anthropogenic hazards

- 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, Covid-19 pandemic.

UNIT- II: Disaster Management:

- 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)

[Handwritten signatures and initials]
Anshu
Sandeep
Amrita dal

REFERENCE BOOKS FOR DSE-601T

- 1. ENVIRONMENTAL EDUCATION AND DISASTER MANAGEMENT BY VARUN DUTT SHARMA, S. K. PANDEY & VIMAL KUMAR SHARMA – CBS Pub.**
- 2. DISASTER MANAGEMENT BY Mrinalini Pandey- Wiley Pub.**
- 3. DISASTER MANAGEMENT BY R. SHUBRAMANIAN - Vikas Pub.**
- 4. DISASTER MANAGEMENT BY PRAVEEN KUMAR- Oak Bridge Pub.**
- 5. DISASTER MANAGEMENT CONCEPTS & APPROACHES BY DEBARATA MONDAL & DEBARATA BASU - CBS Pub.**

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Sandeep

Amita Lal

Anshul
Dutt

Shoh
Munish
Jain

B.Sc. Environmental Science Hons.

Semester – VI

DSE-602T: SOLID, INDUSTRIAL WASTE MANAGEMENT & RESOUCRE RECOVERY

There shall be three groups. Group A is compulsory and span over the entire subject of this paper in the form of multiple choices / true or false / fills in the blanks and will carry 20 marks. In group-B, 3 questions carry 5 marks each and in Group-C, 2 questions carrying 12.5 marks each are to be answered. Examinees will be required to answer questions from all the three groups.

Full Marks 60+15 = 75

Exam Duration: 2.5 Hrs.

No. of lectures: 90 = (60+30)

UNIT-I: SOLID WASTE MANAGEMENT

- Introduction: sources and generation of solid waste, their classification and chemical composition, characterization of municipal solid waste, hazardous and bio medical waste.
- Segregation of waste at source and resource recovery. Storage, transportation and disposal.
- Impact of solid waste on environment, human and plant health.
- Effect of solid waste and industrial effluent discharge on water quality and aquatic life.
- Mining waste and land degradation

UNIT II; INDUSTRIAL WASTE MANAGEMENT AND RESOUIRCE RECOVERY

- Types of industrial waste: hazardous and non-hazardous,
- Effect of industrial waste on air, water, soil.
- Industrial waste management and its importance.
- Hospital and Biomedical waste management.
- 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

[Handwritten signatures and initials in blue ink, including "Sachin", "Anshul", "Dheer", "Sandeep", "Anshita", and "Jal"]

REFERENCE BOOKS FOR DSE-602T

1. **SOLID AND HAZARDOUS WASTE MANAGEMENT BY M. N. RAO AND RAZIA SULTANA – BS Publication.**
2. **SOLID WASTE MANAGEMENT BY SUBHASH ANAND – Mittal Publication.**
3. **MUNICIPAL SOLID WASTE MANAGEMENT BY DR. R. SARAVANAN – Lakshmi Publication.**
4. **PROSPECTS AND PROSPECTIVES OF SOLID WASTE MANAGEMENT BY PROF. B. B. HOSETTI- New Age International Publication.**
5. **INDUSTRIAL WASTEWATER TREATMENT BY A. D. PATWARDHAN – PHI Publication.**

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B.Sc. Environmental Science Hons.

Semester – VI

CCU- (601P + 602P) + DSE- (601P + 602P): PRACTICAL

Full marks: 100

Time - 3 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
- Any other local specific environmental problem/ issues (e.g., Mining Related, Water crisis, Problems Related to Soil, Air Pollution, Deforestation.)

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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[Handwritten signatures and marks]
Sushant
Hansu
Saur
Sandeep
Amrita Lal