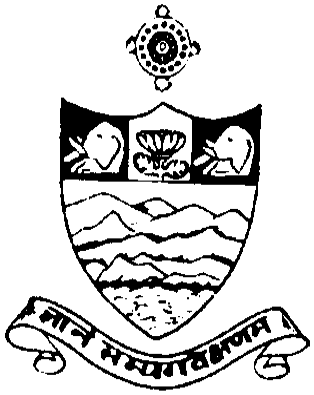
Syllabus- CBCS

National Education Policy (NEP) - 2020

M. Sc., ENVIRONMENTAL SCIENCE
2 Year PG Course

Approved by Board of Studies from the year 2025-2026 onwards



DEPARTMENT OF ENVIRONMENTAL SCIENCE
SVU COLLEGE OF SCIENCES
SRI VENKATESWARA UNIVERSITY

SRI VENKATESWARA UNIVESITY, TRUPATI-517 502, A.P., INDIA

M.Sc. Environmental Science Syllabus
(For Two year PG Program with Course Work in First 3 semesters and project work in fourth semester of second year)
Academic Year 2025-2026

SEMESTER – I								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	101	Core course - 1	4	4	70	30	100
2		102	Core Course – 2(A)	4	3	50	25	75
			Core Course – 2(B)					
3		103	Core Course – 3(A)	4	3	50	25	75
			Core Course – 3(B)					
4	*P	104	Practical- I (related to CC 2 & 3)	6	2	35	15	50
5	SOC	105	Skill Oriented Course – 1(A)	4	3	50	25	75
			Skill Oriented Course – 1(B)					
6		106	Skill Oriented Course – 2(A)	4	3	50	25	75
			Skill Oriented Course – 2(B)					
7	*P	107	Practical- II (related to SOC 1 & 2)	6	2	35	15	50
			Total	**36**	**20**	**340**	**160**	**500**
8	Audit Course	108	Indian Knowledge Systems - 1	4	0	0	100	0

SEMESTER – II								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	201	Core course - 4	4	4	70	30	100
2		202	Core Course – 5(A)	4	3	50	25	75
			Core Course – 5(B)					
3		203	Core Course – 6(A)	4	3	50	25	75
			Core Course – 6(B)					
4	*P	204	Practical- III (related to CC 5 & 6)	6	2	35	15	50
5	*SOC	205	Skill Oriented Course – 3(A)	4	3	50	25	75
			Skill Oriented Course – 3(B)					
6		206	Skill Oriented Course – 4(A)	4	3	50	25	75
			Skill Oriented Course – 4(B)					
7	*P	207	Practical -IV (related to SOC 3 & 4)	6	2	35	15	50
8	*OOTC	208	Open Online Transdisciplinary Course – 1	-	2	-	100	100
			Total	**36**	**22**	**340**	**260**	**600**
9	Audit Course	209	Indian Knowledge Systems - 2	4	0	0	100	100

SEMESTER – III								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	301	Core course – 7	4	4	70	30	100
2		302	Core Course – 8(A)	4	3	50	25	75
			Core Course – 8(B)					
3		303	Core Course – 9(A)	4	3	50	25	75
			Core Course – 9(B)					
4	*P	304	Practical- V (related to CC 8 & 9)	6	2	35	15	50
5	*SOC	305	Skill Oriented Course – 5(A)	4	3	50	25	75
			Skill Oriented Course – 5(B)					
6		306	Skill Oriented Course – 6(A)	4	3	50	25	75
			Skill Oriented Course – 6(B)					
7	*P	307	Practical- VI (related to SOC 5 & 6)	6	2	35	15	50
8	*OOTC **(OR)** Open Elective	308	Open Online Transdisciplinary Course – 2	-	2	-	-	100
			(OR)					
			Open Elective	4	2	70	30	100
*	Seminar / tutorials / remedial classes and Quiz as part of internal assessment			4	-	-	-	-
			Total	**40**	**22**	**410**	**190**	**600**

SEMESTER – IV								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	OOSDC **(OR)** SDC-I & II	401	Open Online Skill Development Courses	-	8	-	-	200
			OR					
			Skill Development Course -I	4	4	70	30	100
			Skill Development Course -II	4	4	70	30	100
2	PW	402	Project Work – Orientation classes	24	12	300	0	300
*	Conducting classes for competitive exams, communication skills, UGC / CSIR and NET / SLET examinations			12	-	-	-	-
			Total	**44**	**20**	**440**	**60**	**500**
Total Semesters				**156**	**84**	**1530**	**970**	**2200**

SEMESTER – I								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	ENS-101	Core course - 1 Ecology and Environment	4	4	70	30	100
2		ENS-102	Core Course – 2 (A) Environmental Toxicology and Public Health Core Course – 2(B) Soil Biology	4	3	50	25	75
3		ENS-103	Core Course – 3(A) Energy and Environment Core Course – 3(B) Environmental Geology	4	3	50	25	75
4	*P	ENS-104	Practical- I (related to CC 2 & 3). Ens-102- Environmental Toxicology and Public Health & ENS-103- Energy and Environment	6	2	35	15	50
5	*SOC	ENS-105	Skill Oriented Course – 1 (A) Tools and Techniques in Environmental Sciences Skill Oriented Course – 1(B) Occupational health and Industrial Safety	4	3	50	25	75
6		ENS-106	Skill Oriented Course – 2(A) Food Adulteration and Analysis Skill Oriented Course – 2(B) Solid and Hazardous Waste Management	4	3	50	25	75
7	*P	ENS-107	Practical- II (related to SOC 1 & 2) ENS-105- Tools and Techniques in Environmental Sciences & ENS-106- Food Adulteration and Analysis	6	2	35	15	50
			Total	**36**	**22**	**340**	**160**	**500**
8	Audit Course	ENS-108	Indian Knowledge Systems - 1	4	0	0	0	0

- **CC (Core Courses) - 1st Core Course is mandatory and 2nd & 3rd Core Courses Student can choose one from each code.**
- ***SOC (Skill Oriented Courses) – Student can choose one from each code.**
- ***Practical – I relating to 2nd& 3rd Core Courses and Practical - II relating to 1st & 2nd Skill Oriented Courses (SOC).**
- **Audit Course – Zero Credits but mandatary with only a Pass.**

SEMESTER – II								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	ENS-201	Core course - 4 Environmental Pollution	4	4	70	30	100
2		ENS-202	Core Course – 5(A) Environmental Law and Sustainable Development Core Course – 5(B) Natural Disasters and Management	4	3	50	25	75
3		ENS-203	Core Course – 6(A) Biodiversity and Conservation Core Course – 6(B) Environmental Management and Sustainable Development	4	3	50	25	75
4	*P	ENS-204	Practical- III (related to CC 5 & 6) ENS-203- Environmental Law and Sustainable Development & ENS-204- Biodiversity and Conservation	6	2	35	15	50
5	*SOC	ENS-205	Skill Oriented Course – 3(A) Wastewater Treatment and Management Skill Oriented Course – 3(B) Biostatistics and Computer Applications	4	3	50	25	75
6		ENS-206	Skill Oriented Course – 4(A) Remote Sensing and GIS Skill Oriented Course – 4(B) Water Resources and Watershed Management	4	3	50	25	75
7	*P	ENS-207	Practical -IV (related to SOC 3 & 4) ENS-205-Waste Water treatment and Management & ENS-206- Remote Sensing and GIS	6	2	35	15	50
8	*OOTC	ENS-208	Open Online Transdisciplinary Course – 2	-	2	-	100	100
			Total	**36**	**22**	**340**	**260**	**600**
9	Audit Course	ENS-209	Indian Knowledge Systems – 2	4	0	0	0	0

- **CC (Core Courses) – 4th Core Course is mandatory and 5th & 6th Core Courses Student can choose one from each code.**
- ***SOC (Skill Oriented Courses) – Student can choose one from each code.**
- ***Practical - III relating to 5th & 6th Core Courses and Practical - IV relating to 3rd & 4th Skill Oriented Courses (SOC).**
- ***Open Online Transdisciplinary Course (OOTC) - Students can choose any relevant course of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc.,**
- **Audit Course – Zero Credits but mandatary with only a Pass.**

SEMESTER – III								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	CC	ENS-301	Core course – 7- Environmental Safety	4	4	70	30	100
2		ENS-302	Core Course – 8(A) Environmental Chemistry	4	3	50	25	75
			Core Course – 8(B) Environmental Education					
3		ENS-303	Core Course – 9(A) Environmental Impact Assessment, Audit and Regulations	4	3	50	25	75
			Core Course – 9(B) Global Environmental Issues					
4	*P	ENS-304	Practical -V (related to CC 8 & 9) ENS-302- Environmental Chemistry & ENS-303- Environmental Impact Assessment, Audit and Regulations	6	2	35	15	50
5	*SOC	ENS-305	Skill Oriented Course – 5(A) Statistics, Computer Applications and Modelling	4	3	50	25	75
			Skill Oriented Course – 5(B) Green Technogies					
6		ENS-306	Skill Oriented Course – 6(A) Environmental Engineering	4	3	50	25	75
			Skill Oriented Course – 6(B) Nuclear and Biomedical Waste Management					
7	*P	ENS-307	Practical -VI (related to SOC 5 & 6) ENS-305-Statistics, Computer Applications And Modeling & ENS-306- Environmental Engineering	6	2	35	15	50
8	*OOTC **(OR)** Open Elective	ENS-308	Open Online Transdisciplinary Course – 2	-	2	-	-	100
			(OR)					
			Natural Resources Conservation	4	2	70	30	100
*	Seminar / tutorials / remedial classes and Quiz as part of internal assessment			4	-	-	-	-
			Total	**40**	**22**	**410**	**190**	**600**

- **CC (Core Courses) – 7th Core Course is mandatory and 8th & 9th Core Courses Student can choose one from each code.**
- ***SOC (Skill Oriented Courses) – Student can choose one from each code.**
- ***Open Online Transdisciplinary Course (OOTC) - Students can choose any relevant course of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc.,**
- ***Practical - V relating to 5th & 6th Core Courses and Practical - VI relating to 5th & 6th Skill Oriented Courses (SOC).**

SEMESTER – IV								
S. No	**Course**	**Code**	**Title of the Course**	**H/W**	**C**	**SEE**	**IA**	**Total Marks**
1	OOSDC **(OR)** SDC-I & II	ENS-401	Open Online Skill Development Courses	-	8	-	-	200
			(OR)					
			Nanotechnology: Environmental Applications	4	4	70	30	100
			Environmental Microbiology and Biotechnology	4	4	70	30	100
2	PW	ENS-402	Project Work – Orientation classes	24	12	300	0	300
*	Conducting classes for competitive exams, communication skills, UGC / CSIR and NET / SLET examinations			12	-	-	-	-
			Total	**44**	**20**	**440**	**60**	**500**
Total Semesters				**156**	**84**	**1530**	**970**	**2200**

- Open Online Skill Development Course (OOSDC) - Students can choose any **Two** relevant courses of his / her choice from the online courses offered by governmental agencies like SWAYAM, NPTEL, etc., **to get 8 credits (with 4 credits from each course).**

ENS-308. (OOTC) Open Online Transdisciplinary Course – II

(OR)
OPEN ELECTIVE

ENS. 308 :: NATURAL RESOURCES CONSERVATION

Course objectives

- To introduce the importance of natural resources and its management.
- To integrate technical field knowledge with analytical skills to solve important natural resource management problems.
- To understand different practices of agriculture and its impact on environment and food stock.
- To understand use and exploitation of mineral and food resources daily life.

UNIT – I

Natural Resources: Definition – Importance – Classification – Human physiological socio-economic and cultural development – Human Population Explosion – Natural Resource Degradation – Concept of conservation – Value system – Equitable resource use for sustainable life system.

UNIT – II

Forest Resources: Forest cover in India and the World – Importance – Desertification – Forest Wealth – Afforestation – VanasamrakshnaSamithi in A.P. – Agroforestry – Social Forestry – Joint Forest Management Strategy for Forest Conservation.

Wild Life: Resources – Importance – Benefits – Wild life Extinction – Causes for Extinction – List of Endanger species in India and in the World – Ecological approach in wild life management – Eco Tourism – Wild Life projects in India – Sanctuaries and National Parks In India – Man and Bio sphere Programme – Aesthetic type of Conservation by TTD.

UNIT – III

Land and Soil Resources: Soil, Complexity of soil nature, regional deposits, Land use and capability classification systems, Land use Planning models and their limitations. Impacts of natural and man-made activities on land characteristics and land use planning– Soil Erosion – Loss of Soil Nutrients – Restoration of Soil Fertility – Soil Conservation Methods and Strategies in India.

Wet Land Conservation and Management – Ecological Importance of wet lands in India – Conservation Strategy and ecological Importance.

Water Resources: Rivers and Lakes In India – Water Conservation and ground water level increase - -Watershed Programme.

UNIT – IV

Mineral Resources: Use and exploitation – Environmental effects of extracting and using mineral resources – Restoration of mining lands – Expansion of supplies by substitution and conservation.

Food Resources: World Food Problems – Changes caused by agriculture – overgrazing effects of modern agriculture – Fertilizer-Pesticide problems – Water Logging – Salinity – Sustainable agriculture, life stock breeding and farming.

REFERENCES:

1. Haue R and Freed V.H., Environmental Dynamics of Pesticides, Menum Press, London (1975).
2. Singh B, Social Forestry for Rural Development, Anmol Publishers, New Delhi (1992).
3. Shafi. R., Forest Ecosystem of the World, (1992)
4. Trivedi R.K., Environment and Natural Resources Conservation, (1994).
5. Murthy J.V.S., Watershed Management in India, (1994).
6. Raymond F Dasmann, Environmental Conservation, John Wiley (1984).
7. Nalini K.S., Environmental Resources and Management, Anmol Publishers, New Delhi (1993).
8. Land use in Mining Area of India, RekhaGhosh,Envis, ISM Dhanbad, ISSN 0972-4656
9. Environmental Land use planning and Management, John Randolph, Island Press.

Course outcomes

- Application of theories and methods with interdisciplinary approach towards natural resource management.
- Critically examining the gap in the resource availability, use and conservation.
- Environment conservation and employment generation.
- Describe sustainable agriculture management.

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3			2		2	3				2	3
CO2	3			2	2	3	3				2	3
CO3	3			2	2	2	3				2	3
CO4	3			2	2	3	3				2	3

SEMESTER-IV

ENS-401 :: OOSDC- OPEN ONLINE SKILL DEVELOPMENT COURSE

OR

SKILL DEVELOPMENT COURSES

ENS-401 :: NANOTECHNOLOGY: ENVIRONMENTAL APPLICATIONS (SDC-1)

Course Objectives:

- Equip the students with the basic concepts and principles of nanoscience and nanotechnology.
- Provide a basic understanding of nanomaterial synthesis approaches and methods.
- Explain the theoretical basis of the techniques required for characterization of nanomaterials.
- Develop an understanding of varied applications of nanotechnology in the area of environmental remediation.

UNIT- I: Introduction

Nanoscience and Nanotechnology; Basics and scale of nanotechnology; History of nanotechnology; Nanoscale material classification; Properties of nanoparticles

UNIT- II: Synthesis Methods

Introduction to 'Top-down' vs. 'Bottom-up' approach of synthesis; Physical, Chemical and Biological methods of nanomaterial synthesis; Pro and cons of synthesis methods

UNIT- III: Characterization Techniques

Basic understanding of multiple techniques with special emphasis on characterization at nano scale - X-ray diffraction analysis; Fourier transform infrared spectroscopy; Raman spectroscopy; X-ray photoelectron spectroscopy; Transmission electron microscopy; Scanning electron microscopy; Atomic force microscopy; Vibrating sample magnetometry; Thermal gravimetric analysis.

UNIT- IV: Environmental Application

Role of nanoparticles in environmental clean-up; Application of nanomaterial for wastewater treatment, water disinfection, contaminated groundwater/ surface water and soil/sludge/sediment treatment; Remediation mechanisms; Potential risks, public health and environmental concerns; Case studies.

References

1. *Sellers K., Mackay C., Bergeson L.L., Clough S.R., Hoyt M., Chen J., Henry K., Hamblen J. Nano-technology and the environment, CRC Press, Taylor and Francis Group.*
2. *Shong C.W., Haur S.C., Wee A.T.S. Science at the Nanoscale - An Introductory Text Book, PAN Stanford Publishing.*
3. *Kane D.M., Micolich A., Roger P. Nanomaterials: Science and Applications. Pan Stanford, 2016.*
4. *Krishnamoorthy S. Nanomaterials: A Guide to Fabrication and Applications. CRC Press, 2015.*
5. *Haghi A.K., Zachariah A.K. and Kalariakkal N. Nanomaterials: Synthesis, Characterization and Applications. Apple Academic Press. 2013.*

Course Outcomes:

- Acquire knowledge relating to the fundamentals in the area of nanoscience & nanotechnology and understand the discipline's relevancy to human society.
- Gain familiarity with different methods of nanomaterial synthesis.
- Explain the suitability of characterization technique for identification of varied nano-related properties.
- Apply fundamental concepts of nanotechnology to the problems of environmental pollution

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3	3	3	2	2		3					3
CO2	3	3	2	2	2		3					3
CO3	3	2	2		1		3					3
CO4	3	2	1	3	3		3					3

ENS 401::ENVIRONMENTAL MICROBIOLOGY AND BIOTECHNOLOGY (SDC-II)

Course Objectives:

- To promote awareness of microbial applications in biotechnology, immunology, and environmental science.
- Introduce the role of microorganisms in food production, spoilage, preservation, and safety.
- Explore real-world applications in agriculture, medicine, industry, and environmental science..
- To introduce the concept and classification of biofertilizers and their role in sustainable agriculture.

UNIT-I: General Microbiology

Bacterial morphology: shape, size; Plasmid and chromosome; fungal morphology; Microbes of air, water and soil; Isolation, characterization and microbial growth analysis

Impacts of social movements on ecological and social justice in India; Corporate responsibility movement; Appropriate technology movement, industrialization, urbanization, and globalization,

UNIT-II: Food Microbiology

Contamination and microbial spoilage of fresh food and its preservation; food adulteration; fermented food; food poisoning; bacterial infections and intoxications, viral food borne illness

UNIT-III: Application of Biotechnology

Pollution detection and abatement; Biosensor, microbial biosensor, gasphase biosensor, Nano biosensor, environmental application of biosensor; agriculture application:

UNIT-IV: Bio-fertilizer

Types and application in agriculture; bio-pesticides; bio-composting; integrated pest management- concept; GMO and its merits and demerits

References:

1. *Environmental Impact Assessment,* Canter, L. McGraw Hill
2. *Environmental and Social Impact Assessment: An Introduction;* Barrow, John Wiley & Sons
3. *Casarett & Doull's Toxicology;* The basic Science of poisons, 2nd Den, Editors, J. Doull, C.D. Klaassen, M.O. Amdur, Macmillan Publishing Co. Inc., NY. Edn. John Doull, Curtis D
4. *Fundamentals of Ecotoxicology*, 3rdEdn., Michael C Newman, CRC Press, Taylor & Francis Group ,London,, 2010
5. *Principles of Biochemical Toxicology;* 3 Edn, JoghTimbrell, Taylor &Francis , 2000
6. *Environmental Toxicology;* David A Wright, and Pamela Welbourn, Cambridge University Press, 2002
7. *Environmental Impact Assessment: A Guide to Best Professional Practices* (HB) Taylor & Francis(CRC)
8. *Environmental Biotechnology (PB): CBS*; Allen, K
9. *Toxicants in the aquatic ecosystem,* T. R. Crompton, John Wiley & Sons, NY. *Cell and Molecular Biology;* EDP De Robertis, EMF De Roberts, Jr, International Edition, 1988.

Course Outcomes:

- The student should be able to understand microbial cell structure and function, including bacteria, viruses, and fungi.
- Apply microbiological techniques to detect and control foodborne pathogen.
- Design and propose biotechnological solutions for challenges in agriculture, healthcare, and sustainability.
- Evaluate environmental and economic benefits of biofertilizer use over chemical fertilizers.

CO-PO Mapping

CO outcomes	PO_1 Knowledge	PO_2 Analysis	PO_3 Design	PO_4 Development	PO_5 Modern Tools	PO_6 Society	PO_7 Environment	PO_8 Ethics	PO_9 Team Work	PO_{10} Communi-cation	PO_{11} Programme Management	PO_{12} Lifelong Learning
CO1	3	3	3	2	2	2	3					3
CO2	3	3	2	3	3	2	3					3
CO3	3	2	2		1	3	3					3
CO4	3	2	3	3	3	3	3					3

MODEL QUESTION PAPER
M.Sc. DEGREE EXAMINATION
THIRD SEMESTER
Branch - Environmental Science
Paper-VI-ENS.308: NATURAL RESOURCES CONSERVATION (OPEN ELECTIVE)

Time: 3 hours **Max. Marks: 70**

PART- A

Answer any FOUR of the following questions. Each question carries 5 Marks(Marks: 5x4=20)

1. Write a brief note on equitable resources use in life styles.
2. Give brief account on natural resources degradation.
3. Briefly explain the concept of Joint Forest Management Strategy.
4. Write note on the limitations of land use planning models.
5. Write brief the concept of Sanctuaries and National Parks.
6. Give a brief note on the importance Ramsar Convention.
7. Briefly explain the Rain water harvesting programmes in India
8. Write a brief note on impacts of overgrazing on soil fertility

PART-B

Answer ALL questions .Each question carries 12½ marks. **(Marks: 4x12½=50)**

9. (a) Give an account on definition, types and significance of Natural Resources.

Or

(b) Explain the conservation measures for the protection of forest resources.

10. (a) What is meant by desertification and give an account on its impacts?

Or

(b) Discuss on applied ecological principles in wildlife conservation and management.

11. (a) Explain the various types of soil conservation methods and strategies in India.

Or

(b) Write in detail on ecological importance of wetlands and its conservation practice.

12. (a) Write a note on acid mine drainage and explain methods of restoration of mining lands.

Or

(b) Discuss in detail about the sustainable agriculture practices and food security in India.

MODEL QUESTION PAPER
M.Sc. DEGREE EXAMINATION
FOURTH SEMESTER
Branch - Environmental Science
(Skill Development Course-1)
Paper-I-ENS.401: NANOTECHNOLOGY: ENVIRONMENTAL APPLICATIONS

Time: 3 hours **Max. Marks: 70**

PART- A

Answer any FOUR questions. Each question carries 5 Marks (Marks: 4x5=20)

1. What is mean by nanotechnology?
2. Explain the different types of nanomaterials and their unique properties.
3. Discuss briefly biological methods of nanomaterial synthesis.
4. Discuss briefly chemical methods of nanomaterial synthesis.
5. Write the applications of Fourier transform infrared spectroscopy.
6. Write the applications of Transmission electron microscopy.
7. What are the potential benefits of using nanotechnology in environmental remediation.
8. How can nanomaterials be used for water purification?

PART-B

Answer ALL questions .Each question carries 12½ marks. (Marks: 4x12½=50)

9. (a) Discuss the classification of nanomaterials.

Or

(b)Explain the nanotechnology considered a promising field for environmental applications.

10. (a) Discuss on physical methods of nanomaterial synthesis.

Or

(b) Give a detail account on Pro and Cons of synthesis methods..

.

11. (a) Discuss in detail about Scanning electron microscopy.

Or

(b) Give a detail account on Atomic force microscopy.

12. (a) Explain the mechanisms of action for nanomaterials in soil remediation

Or

(b) Discuss on the mechanisms of action for nanomaterials in removing pollutants from water.

MODEL QUESTION PAPER
M.Sc. DEGREE EXAMINATION
FOURTH SEMESTER
Branch - Environmental Science
(Skill Development Course-1I)
Paper-I-ENS.401: ENVIRONMENTAL MICROBIOLOGY AND BIOTECHNOLOGY

Time: 3 hours **Max. Marks: 70**

PART- A

Answer any FOUR questions. Each question carries 5 Marks (Marks: 4x5=20)

1. Write a short note on Bacterial morphology.
2. Explain briefly about industrilization.
3. Discuss briefly on microbial spoilage of fresh food.
4. Explain in brief about the process of fermentation.
5. Write a short note on pollution control measures.
6. Give a brief note on agricultural applications of biotechnology.
7. Write short on bio-pesticides.
8. Discuss briefly the concept of GMOs.

PART-B

Answer ALL questions .Each question carries 12½ marks. (Marks: 4x12½=50)

9. (a) Explain in detail the role of microorganisms in the soil.

Or

(b) Explain the impact of urbanization on environment.

10. (a) Give an account on microbial contamination of food.

Or

(b) Explain bacterial infections and intoxications.

11. (a) Write in detail the impact of air pollution on humans.

Or

(b) Explain the environmental applications of biosensor.

12. (a) Describe the process of Biofertilizer production.

Or

(b) Discuss on integrated pest management.