

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF CHEMISTRY

COURSE CURRICULUM

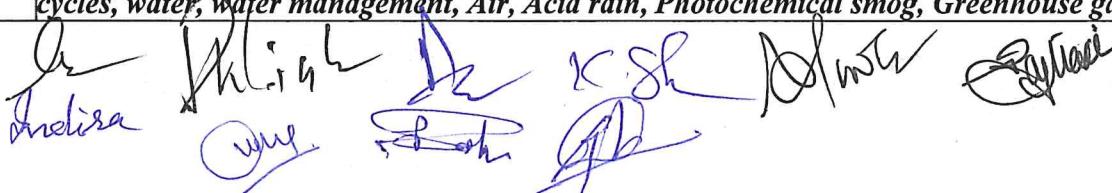
PART-A: Introduction

Program: Bachelors in Science (Diploma /Degree/Honors)		Semester-IV	Session: 2024-2025
1	Course Code	CHSE-02T	
2	Course Title	ENVIRONMENTAL CHEMISTRY	
3	Course Type	DSE	
4	Pre-requisite(if, any)	As per Program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ To explore the environment through the lens of chemistry, examining interactions between the biosphere, lithosphere, hydrosphere, and atmosphere. ➤ To delve into ecological principles, biogeochemical cycles, and the challenges of thermal and noise pollution. ➤ To develop concept of water quality, water management, and the multifaceted issue of water pollution take center stage. ➤ To investigate air pollution, soil composition, radiation chemistry, and potential solutions for environmental challenges. 	
6	Credit Value	03 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max.Marks:100	Min. PassingMarks:40

PART-B: Content of the Course

Total No.of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)

Module /Unit	Topics(Course contents)	No.of Period
I	Introduction to Environmental Chemistry Biosphere, Lithosphere, Hydrosphere and Atmosphere, Ecological principles- aspects of ecology, classification, types of ecosystems. Biogeochemical cycles- carbon, nitrogen, phosphorous, oxygen, hydrogen. Thermal pollution: sources, harmful effects, and prevention of thermal pollution. Noise pollution: sources, effects, and control of noise pollution.	12
II	Water Origin, physico-chemical properties of water, sources of water, hydrological cycle, criteria of water quality, Water management- water shed management, rainwater harvesting, water pollution- sources, consequences and harmful effects of water pollution, strategies for water pollution control.	11
III	Air Major regions of the atmosphere, composition of the atmosphere, temperature inversion and air pollution episodes, photochemistry of the atmosphere, depletion of the stratospheric ozone, greenhouse effect, greenhouse gases, remedial measures for reversion of greenhouse effect, acid rain, photochemical smog, particulate matter.	11
IV	Soil and radiation pollution Chemical and mineralogical composition of soil, classification of soil, types of soil- saline and alkaline, physical properties – texture, bulk density, permeability, chemical properties—Ion exchange capacity, soil pH and micro and macro nutrient availability. Introduction to radiation chemistry, sources of radioactive pollution, effects of radioactive pollution, protection from radiation, control of radiation.	11
Keywords	Environment, Chemistry, Atmosphere, Hydrosphere/Biosphere/lithosphere, Biogeochemical cycles, water, water management, Air, Acid rain, Photochemical smog, Greenhouse gases,	


 A row of handwritten signatures in blue ink, likely belonging to faculty members, is placed below the table. The signatures are somewhat stylized and overlapping.

Signature of Convener & Members (CBoS) :

PART-C

Learning Resources: Text books, Reference Books and Others

Textbooks Recommended-

1. Dara, S. S. (2002). *Environmental chemistry*. New Delhi: S Chand & Company Ltd.
2. De, A. K. (2003). *Environmental chemistry*. New Delhi: New Age International.
3. Mahajan, (2010). *Environmental chemistry*. New Delhi: S Chand & Company Ltd.
4. Kudesia, V. P. (1985). *Water pollution*. Pragati Prakashan.

Reference Books Recommended-

1. Chiras, D. D. (1994). *Environmental science* (4th ed.). Jones & Bartlett Learning.
2. Bockris, J. O. M. (1977). *Environmental chemistry*. Academic Press.
3. Lodge, J. P. (1994). *Methods of air sampling and analysis*. Publications, Jaipur.
4. Moore, W., & Moore, J. (2010). *Environmental chemistry*. CRC Press.

OnlineResources-e-Resources/e-booksand-e-learningportals

- <https://ncert.nic.in/textbook/pdf/kech207.pdf>
- <https://archive.nptel.ac.in/courses/122/106/122106030/>
- <https://scienceinfo.com/environmental-chemistry-definition-importance-application-and-careers/>
- <https://www.ncbi.nlm.nih.gov/books/NBK83730/>
- <https://ebooks.inflibnet.ac.in/esp16/chapter/water-pollution/#:~:text=The%20amount%20of%20dissolved%20oxygen,dissolved%20oxygen%20than%20saline%20water.>
- [https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science_\(Brown_et_al.\)/18%3A_Chemistry_of_the_Environment](https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-_The_Central_Science_(Brown_et_al.)/18%3A_Chemistry_of_the_Environment)
- <https://byjus.com/chemistry/environmental-chemistry/>
- <https://www.nrdc.org/stories/water-pollution-everything-you-need-know#whatis>

Part-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

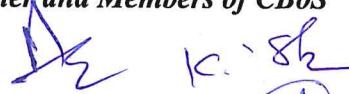
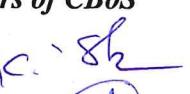
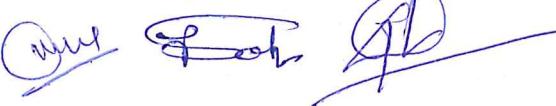
Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 & 20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x 1 = 10 Mark; Q2. Short answer type- 5 x 4 = 20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit- 4 x 10 = 40 Marks.	

Name and Signature of Convener and Members of CBoS

Indira 
Anil 
K. S. 
Shivaji 
Anil 

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DEPARTMENT OF CHEMISTRY
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - IV	Session: 2024-2025
1	Course Code	CHSE-02P	
2	Course Title	ENVIRONMENTAL CHEMISTRY LAB. COURSE	
3	Course Type	DSE	
4	Pre-requisite (if, any)	-	
5	Course Learning Outcomes (CLO)	<ul style="list-style-type: none"> ➢ To know the basic idea on techniques of water analysis and acidity alkalinity ➢ To get experience with the calculations of BOD and COD ➢ To understand the basics of soil analysis viz. pH, Conductivity. ➢ To have an experience on the determination of heavy metals in soil and Colorimetric estimation of iron and manganese. ➢ To familiarize with interpretation of data 	
6	Credit Value	01Credit	Credit =30 Hours Laboratory or Field learning/Training
7	Total Marks	Max.Marks:50	Min. Passing Marks:20

PART-B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics(Course contents)	No. of Period
Lab./Field Training/ Experiment Contents of Course.	<p>Water Analysis</p> <ul style="list-style-type: none"> a. Alkalinity b. Acidity c. Temporary, Permanent and total hardness d. Sulphate e. Phosphorus <p>Water analysis</p> <ul style="list-style-type: none"> e. Nitrates f. Chlorides g. D.O, BOD and COD h. Insecticides i. Pesticides <p>Analysis of chemicals used in water and waste water treatment-Alum, bleaching powder, activated carbon.</p> <p>Determination and comparison of chlorine content in tap water, storage tank and swimming pool.</p>	
		30
	<p>Soil Analysis</p> <p>Determination of:</p> <ul style="list-style-type: none"> a. pH b. Conductivity c. Ca d. Mg e. Heavy metals like Cr, Pb, Cd, Zn. 	
	<p>Miscellaneous</p> <p>Analysis of nutrients – Nitrogen (total, ammonia, nitrite, and nitrate), Phosphate</p> <p>Determination of N,P,K of soil</p>	

Dr. Farzana Khan Dr. K. Sh. D. M. S. R. B.

	<p>Determination of macro and micro nutrients in soil. Sampling of water- tap water, well water, overhead storage tank water pond water and lake water. Physicochemical and organoleptic characteristics of the above water samples. Statistical evaluation of the data obtained for optimization of results. Determination of Total solids, Total dissolved solids and total suspended solids and its significance. Determination of noise pollution in a particular area with noise dosimeter. Study of particulate matter. Study of atmospheric chemistry. Air Monitoring Gas detection.</p>
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Keywords *Sampling, Water, soil, N/P/K, pH, Conductivity, acidity & alkalinity, Heavy metals.*

Signature of Convener & Members (CBoS) :

PART-C

Learning Resources: Text Books, Reference Books and Others

Textbooks Recommended—

1. Dara, S. S., & Asole, B. G. (2017). *Environmental chemistry: Practical approach* (2nd ed.). New Age International (India) Publishers.
2. Trivedi, R. K., Goyal, P., & Trisal, B. S. (2018). *Manual of water and wastewater analysis* (2nd ed.). ABD Publishers & Distributors.
3. Sehgal, H. S. (2010). *A textbook of soil chemical analysis* (2nd ed.). Kalyani

Reference Books Recommended—

1. Vogel, A. I. (1955). *A text-book of quantitative inorganic analysis: theory and practice*. Longmans, Green and Company.
2. Sandell, E. B. (1945). *Colorimetric determination of traces of metals* (Vol. 59, No. 6, p. 481). LWW.
4. Boubel, R. W., Vallero, D., Fox, D. L., Turner, B., & Stern, A. C. (2013). *Fundamentals of air pollution*. Elsevier.
6. Clesceri, L. S. (1998). *Standard methods for examination of water and wastewater*. American public health association, 9.
8. Rump, H. H. (1999). *Laboratory manual for the examination of water, waste water and soil* (No. Ed. 3). Wiley-VCH Verlag GmbH.

Online Resources – e-Resources/e-books and e-learning portals

- <https://ncert.nic.in/textbook/pdf/kech207.pdf>
- <https://archive.nptel.ac.in/courses/122/106/122106030/>
- <https://scienceinfo.com/environmental-chemistry-definition-importance-application-and-careers/>
- <https://www.ncbi.nlm.nih.gov/books/NBK83730/>
- <https://ebooks.inflibnet.ac.in/esp16/chapter/water-pollution/#:~:text=The%20amount%20of%20dissolved%20oxygen,dissolved%20oxygen%20than%20saline%20water.>
- [https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-The_Central_Science_\(Brown_et_al.\)/18%3A_Chemistry_of_the_Environment](https://chem.libretexts.org/Bookshelves/General_Chemistry/Map%3A_Chemistry_-The_Central_Science_(Brown_et_al.)/18%3A_Chemistry_of_the_Environment)
- <https://byjus.com/chemistry/environmental-chemistry/>
- <https://www.nrdc.org/stories/water-pollution-everything-you-need-know#whatis>
- <https://www.envirotech-online.com/news/gas-analyser/157/envea/portable-multi-gas-analyser-gains-qall-certification-for-so2/60799>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE):	35 Marks	
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar +Attendance - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory / Field Skill Performance: On spot Assessment D. Performed the Task based on lab. work - 20 Marks E. Spotting based on tools & technology (written) – 10 Marks F. Viva-voce (based on principle/technology) - 05 Marks	Managed by Course teacher as per lab. status

Name and Signature of Convener and Members of CBoS

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The image shows handwritten signatures in black ink. From left to right, the signatures are: Dr. D. G. Suryanarayana, Dr. K. S. Rao, Dr. N. S. Krishnamoorthy, Dr. S. S. S. Rao, Dr. S. S. S. Rao, and Dr. S. S. S. Rao. Below the first two signatures, the name 'Indira' is written in a cursive script.