

How - year

**DEPARTMENT OF INDUSTRIAL CHEMISTRY
COURSE CURRICULUM**

PART-A: Introduction			
Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - IV	Session: 2024-2025
1	Course Code	ICSE-02T	
2	Course Title	ENVIRONMENTAL REMEDIATION	
3	Course Type	DSE	
4	Pre-requisite(if,any)	As per program	
5	Course Learning Outcomes(CLO)	<ul style="list-style-type: none"> ➤ Understand pollutants, their statutory limits and air pollution as well as water pollution. ➤ Acquire knowledge and handling of pesticide, gaseous, and solid waste pollution. ➤ Gain knowledge about soil economics and project handling. ➤ Acquire knowledge and handling technology and quality control. 	
6	Credit Value	3 Credits	Credit = 15 Hours -learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks:40
PART -B: Content of the Course			
Total No. of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Pollutants and their statutory limits: Definition and classification of pollutants, primary and secondary pollutants, Pollution evaluation methods. Air Pollution: Sources and classification of air pollution, major air pollutants and their health impacts, phenomenon of acid rain, photo chemical smog and ozone depletion, composition of fly-ash, pollution control equipment/techniques. Water pollution: Types of water pollution, organic and inorganic pollutants, point and nonpoint sources of water pollution, estimation of chlorine in water, measurement of BOD & COD, techniques for removal of waste from water.		12
II	Pesticide pollution: Classification of chemical pesticides, examples of organochlorines and organophosphates, persistent organic pollutants (POPs) and their half-lives, environmental effects of pesticides, soil and water contamination and its impact, bioaccumulation of pesticides and pesticide contamination in food. Solid & gaseous wastes: Removal of solid contaminants of wastes- coagulation, sedimentation, flocculation, solid waste disposal, incineration, fuel pelletization, soil conditioning Adsorption, catalytic/non catalytic conversion, recovery of important gases, CO ₂ , SO ₂ , NO etc. electrostatic precipitation and bag filters.		11
III	Soil economics A: Factors involved in project cost estimation; methods employed for the estimation of capital investment, capital formation, elements of cost accounting, interest and investment costs, time value of money equivalence. Soil economics B: Methods of determining depreciation, some aspects of marketing, pricing policy, profitability criteria, economics of selecting alternatives, variation of cost with capacity, break-even point, optimum batch sizes, production scheduling etc.		11
IV	Soil economics C: Need, scope and characteristics of entrepreneurship, special schemes		11

	for technical entrepreneurs' development (STED), exposure to demand based, resource based, service based, import substitute and export promotion industries, criteria for principles of products selection and development. Choice of technology and quality control: Plant and equipment's, techno-economic feasibility of the projects, plant layout and process planning for the project. Quality control, quality assurance and testing of the product, packaging, advertising and aftersales service.
Keywords	Pollution, air, water, soil, pesticides, solid, gaseous, wastes, economics, technology quality control.

Signature of Convener & Members (CBoS):

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Trivedy, R. K., & Raman, N. S. (2002). *Industrial Pollution and Environmental Management*. Scientific Publishers.
2. Rathore, H. S., & Nollet, L. M. (Eds.). (2012). *Pesticides: Evaluation Of Environmental Pollution*. CRC Press.
3. De, A. K. (2003). *Environmental Chemistry*. New Delhi: New Age International.

Reference Books Recommended –

1. Brusseau, M. L., Pepper, I. L., & Gerba, C. P. (2019). *The Extent Of Global Pollution. In Environmental And Pollution Science (Pp. 3-8)*. Academic Press.
2. Rad, P. F. (2001). *Project Estimating and Cost Management*. Berrett-Koehler Publishers.

Online Resources–

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

- <https://nptel.ac.in/courses/126105016>
- <https://nptel.ac.in/courses/105103205>
- <https://nptel.ac.in/courses/126105010>
- <https://nptel.ac.in/courses/105/102/105102089/>
- <https://nptel.ac.in/courses/122/106/122106030/>
- <https://nptel.ac.in/content/storage2/courses/120108004/module1/lecture1.pdf>

Online Resources–

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

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

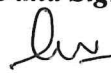





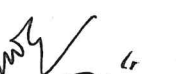
Maximum Marks: 100 Marks

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 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1out of 2 from each unit- 4x10=40Marks	

Name and Signature of Convener & Members of CBoS:

Indira  Next page      

FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)

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DEPARTMENT OF INDUSTRIAL CHEMISTRY
COURSE CURRICULUM

PART-A: Introduction			
Program: Bachelor in Science (Diploma / Degree/Honors)		Semester - IV	Session: 2024-2025
1	CourseCode	ICSE-02P	
2	CourseTitle	ENVIRONMENTAL REMEDIATION LAB COURSE	
3	CourseType	DSE	
4	Pre-requisite(if,any)	As per program	
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. 	
6	CreditValue	1 Credits	Credit =30 Hours Laboratory or Field learning/Training
7	TotalMarks	Max.Marks:50	Min Passing Marks:20
PART -B: Content of theCourse			
TotalNo.of learning-Training/performancePeriods:30 Periods (30 Hours)			
Module	Topics(Coursecontents)		No.ofP eriod
Lab./Field Training/ Experiment Contents of Course	<ul style="list-style-type: none"> • Determination of acidity and alkalinity of water samples. • Determination of temporary, permanent, and total hardness of water. • Determination of chloride, sulphate, nitrite, and phosphates in water samples. • Determination of D.O, BOD, and COD. • Determination of pH of soil samples. • Determination of conductivity of soil samples. • Determination of metal (Ca & Mg). • Determination of heavy metals like Cd, Pb, Cr, Zn. • Report on soil economics. • Project/survey on environmental management/technologies, and quality control.. 		30
Keywords	Water, acidity, alkalinity, water hardness, D.O., BOD, COD, metals, pH, economics, technology, water quality.		

Signature of Convener & Members (CBoS):

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Birdie, G. S. (2020). Water supply and sanitary engineering (10th ed.). Dhanpat Rai Publishing Company.
2. Biswas, T. D., & Mukherjee, T. K. (2008). A textbook of soil science (2nd ed.). Tata McGraw-Hill Education.
3. Das, D. K. (2011). Soil analysis in agricultural chemistry and environmental science. Kalyani Publishers.

Reference Books Recommended-

1. Vogel, A. I. (1955). A text-book of quantitative inorganic analysis: theory and practice. Longmans, Green and Company.
2. Harrison, R. M. (Ed.). (2012). Handbook of air pollution analysis. Springer Science & Business Media.
3. Boubel, R. W., Vallero, D., Fox, D. L., Turner, B., & Stern, A. C. (2013). Fundamentals of air pollution. Elsevier.

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://www.ncbi.nlm.nih.gov/books/NBK83730/>
- [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.envirotech-online.com/news/gas-analyser/157/envea/portable-multi-gas-analyser-gains-qal1-certification-for-so2/60799>.

Online Resources–

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

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

End Semester Exam(ESE):35Marks

Continuous Internal Assessment(CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 10 Assignment/Seminar + Attendance - 0 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 & Members of CBoS:

Indira

Quip

Batu

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Aditya

Pratik