



AKPC MAHAVIDYALAYA

DEPARTMENT OF ENVIRONMENTAL SCIENCE

36 HOURS ADD-ON COURSE IN

INDUSTRIAL POLLUTION CONTROL AND MANAGEMENT

(2021-22)

I. BASIC DETAILS OF THE 36 HOURS ADD-ON COURSE

Sl. No.		
1	Institute/ College Name	AKPC Mahavidyalaya
2	Department	ENVIRONMENTAL SCIENCE
3	Name of the Program	ADD-ON COURSE (36HOURS)
4	Course Title	INDUSTRIAL POLLUTION CONTROL AND MANAGEMENT
5	Context	Providing students the knowledge about how to control Industrial Pollution and also provide them different ideas of management strategies to handle different pollutions which would help them in Higher Studies and also in getting different job opportunities.
6	Prerequisite	Students of B.Sc., Hons. Semester-I, III and V (CBCS)
7	Course Fee	NIL

8	Intake Capacity	All students of B.Sc., Hons. of Semester-I, III, V of Environmental Science, Zoology and Chemistry Honours (CBCS) under the session 2021 - 2022
9	Course Duration	36 Hours (One Class: 1 Hour)
10	Timing and venue	Classes will be held one day in a week at the Dept. of Environmental Science, AKPC Mahavidyalaya. Practical exposure: Onsite & offsite will be held during day time.
11	Course Coordinator	Prof. AMINA KHATUN
12	Faculty Requirements	Internal-Department of Environmental Science
13	Course Description	This course is designed to develop the skill and knowledge of the students to understand the increasing rate of growth of different industry and their harmful effects on environment as well as human health and the different measures to

		<p>combat or minimize of the pollution load of different industries. This course will also focus on the design of treatment of waste water and industrial effluents; treatment and disposal of solid waste. The course is entirely based on skill development of technical know-how of monitoring techniques with a number of case study analysis, field visits, lab works and industrial training.</p>
14	<p>Course Objectives</p>	<ul style="list-style-type: none"> • To develop the basic skill and knowledge of students in regard to industrial activity • To understand the fundamental and advanced concepts of pollution aspects of industries • To develop the monitoring techniques on wastewater and industrial effluents • To develop the ability to integrate their skill & knowledge in planning, implementation,

		monitoring and evaluation of environmental management.
15	Course Outcomes	<ul style="list-style-type: none"> • Knowledge on the source, quantitative and qualitative characterization of industrial pollutant and their impact on the environment and human health • Understanding the principles of physical, chemical and biological treatment processes • Designing the different treatment technologies • Determination of different environmental quality standards as well as industrial quality parameters • Understanding the legal issues on appropriate mitigation and treatment technologies • Application of knowledge and skill of managing industrial environment by using

		industrial environmental management system
16	Course Content	Details given in Section II
17	Learning Resources	Details given in Section III
18	Lesson Plan	Details given in Section IV
19	Assessment Process	Students will be graded on the Module-end Assessments/ Report Course-end Assessment, Field Report /ProjectSubmission (Details given in Section V, VI, VII and VIII)
20	General Rules and Regulations	Details given in Section IX
21	Grade Card Format	Format given in Page 19

II. SYLLABUS STRUCTURE OF THE ADD-ON COURSE

MODULE	MODULE TITLE	HOURS
<p>MODULE - 1</p>	<p>THEORY</p>	<p>6</p>
	<p>BASIC CONCEPTS OF ENVIRONMENTAL POLLUTION</p>	
	<p>Understanding environmental pollution, Sources, types, causes and effects - Water pollution, Air pollution, Soil pollution, Noise pollution, Thermal pollution, Radiation pollution; Acid rain; Green house effects; Global warming; Ozone depletion</p>	
	<p>PRACTICAL</p>	
<p>MODULE - 2</p>	<p>Estimation of water parameters- pH, Temperature, conductivity, Turbidity, Dissolved Oxygen (DO), Alkalinity, Acidity, Hardness, Chloride</p>	<p>6</p>
	<p>Estimation of soil parameters- pH, Temperature, Bulk density, Soil porosity, Organic carbon</p>	
	<p>THEORY</p>	
<p>MODULE - 2</p>	<p>AIR AND NOISE POLLUTION CONTROL METHODOLOGIES</p>	<p>6</p>
	<p>Sources and classification of air pollutants, Air quality standards; Particulates emission control- Gravitational Settling Chambers, Cyclone Separators, Filters, Wet scrubbers, Electrostatic</p>	

	<p>Precipitators; Control of gaseous Emissions- Absorption, Adsorption, Combustion</p> <p>Noise Pollution - general features, measurement of noise, noise mapping, control methodologies of noise pollution</p>	
	<p>PRACTICAL</p>	
	<p>Air pollution- Temperature, Wind speed and direction; Relative humidity; Dust fall measurement</p> <p>Noise pollution- Measurement of noise level by dB meter in different zones</p>	
<p>MODULE - 3</p>	<p>THEORY</p>	<p>6</p>
	<p>INDUSTRIAL WASTE WATER POLLUTION AND WASTEWATER TREATMENT</p>	
	<p>Industrial effluent characteristics; National scenario of industrial waste water pollution; Impact of industrial effluents on environment and human health</p> <p>Characteristics of waste water, Primary, secondary and tertiary treatment of waste water; Biological waste water treatment; Activated sludge; Sludge treatment and disposal; Treatment of industrial effluents; Industry specific treatment scheme - Pulp and Paper waste, Distilleries waste, Tannery waste, Textile Mill waste, Dairy waste, Sugar mill waste</p>	

	PRACTICAL	
	Field Visit to a water treatment plant/ waste water treatment plant/ sewage treatment plant and preparation of visit report	
MODULE - 4	THEORY	6
	WASTE MANAGEMENT	
	Solid waste management- Different techniques used in collection, storage, transportation and disposal of solid waste (municipal, biomedical and hazardous wastes); Industrial waste management - types, effects and importance; Recent trends in industrial waste management; Life cycle analysis	
	PRACTICAL	
	Visit to a effluent treatment plants of Sugar industry/ Textile industry/ Dairy industry/ Iron-Steel plant industry/ Pharmaceutical industry/Thermal Power Plant industry	
MODULE - 5	THEORY	6
	INDUSTRIAL POLLUTION PREVENTION AND CLEANER PRODUCTION	
	Concept of industrial pollution; General characteristics of wastes; Sources, types and processes of industrial wastes-solid, liquid,	

	<p>gaseous wastes; noise and radiation emissions; Concept of pollution prevention and cleaner production-Definition, importance, source reduction techniques, reuse, recover, recycle</p>	
	<p>PRACTICAL</p>	
	<p>Estimation of BOD, COD, Phosphate, TDS, TSS from water samples</p>	
<p>MODULE - 6</p>	<p>THEORY</p>	<p>6</p>
	<p>ENVIRONMENTAL MANAGEMENT AND LEGISLATION</p>	
	<p>Definition and Concept on environmental management; management of air pollution, water pollution, noise pollution, strategies for sustainable water management; Industrial waste audit; Environmental Laws - The Environment Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and Control of Pollution) Act, 1974; The Noise Pollution (Regulation and Control) Act, 2000; Functions of Govt. Agencies for pollution control (CPCB & SPCB); The Factories Act, 1948; The Hazardous Wastes (Management and Handling) Rules, 1989</p>	
	<p>PRACTICAL</p>	
	<p>Submission of Project Report on Industry Visit</p>	

III. LEARNING RESOURCES

Books recommended for Theory:

1. Air Pollution, H.C. Perkins, McGraw Hill
2. A Text book of Environmental Chemistry and Pollution Control, S.S. Dara and D.D. Mishra, S.Chand
3. Environmental Chemistry, A.K. De, New Age (P) Ltd.
4. Environmental Pollution Control Engineering, C.S. Rao, New Age International Publishing Agency
5. Industrial pollution Prevention Handbook, H.M. Freeman, McGraw Hill
6. Industrial Water Reuse and Wastewater Minimization, James G. Mann and V.A. Liu, McGraw Hill
7. Pollution Prevention: Fundamental and Practice, Paul. L. Bishop, McGraw-Hill

Books recommended for Practical:

1. APHA (American Public Health Association), AWWA (American Water Works Association) and Water Pollution Control Federation: Standard Methods for the examination of Water and Waste Water, 23rd Edition (Washington DC American public Health association)
2. Handbook of Water and Waste Water Analysis, Kanwaljit Kaur, Atlantic Publishers & Distributors Pvt. Ltd.

IV. LESSON PLAN

LECTURES	CONTENT
	THEORY
LECTURE-1 (1HOUR)	Understanding environmental pollution, Sources, types, causes and effects - Water pollution, Air pollution
LECTURE-2 (1HOUR)	Soil pollution, Noise pollution, Thermal pollution, Radiation pollution
LECTURE-3 (1HOUR)	Acid rain; Green house effects; Global warming; Ozone depletion
LECTURE-4 (1HOUR)	Sources and classification of air pollutants, Air quality standards; Particulates emission control- Gravitational Settling Chambers, Cyclone Separators, Filters, Wet scrubbers, Electrostatic Precipitators
LECTURE-5 (1HOUR)	Control of gaseous Emissions- Absorption, Adsorption, Combustion
LECTURE-6 (1HOUR)	Noise Pollution - general features, measurement of noise, noise mapping, control methodologies of noise pollution
LECTURE-7 (1HOUR)	Industrial effluent characteristics; National scenario of industrial waste water pollution; Impact of industrial effluents on environment and human health

LECTURE-8 (1HOUR)	Characteristics of waste water, Primary, secondary and tertiary treatment of waste water; Biological waste water treatment; Activated sludge; Sludge treatment and disposal
LECTURE-9 (1HOUR)	Treatment of industrial effluents; Industry specific treatment scheme - Pulp and Paper waste, Distilleries waste, Tannery waste, Textile Mill waste, Dairy waste, Sugar mill waste
LECTURE-10 (1HOUR)	Solid waste management- Different techniques used in collection, storage, transportation and disposal of solid waste (municipal, biomedical and hazardous wastes)
LECTURE-11 (1HOUR)	Industrial waste management - types, effects and importance; Recent trends in industrial waste management; Life cycle analysis
LECTURE-12 (1HOUR)	Concept of industrial pollution; General characteristics of wastes; Sources, types and processes of industrial wastes-solid, liquid, gaseous wastes
LECTURE-13 (1HOUR)	Noise and radiation emissions
LECTURE-14 (1HOUR)	Concept of pollution prevention and cleaner production-Definition, importance, source reduction techniques, reuse, recover, recycle
LECTURE-15 (1HOUR)	Definition and Concept on environmental management; management of air pollution, water pollution, noise pollution
LECTURE-16 (1HOUR)	Strategies for sustainable water management; Industrial waste audit

LECTURE-17 (1HOUR)	Environmental Laws - The Environment Protection Act, 1986; The Air (Prevention and Control of Pollution) Act, 1981; The Water (Prevention and Control of Pollution) Act, 1974
LECTURE-18 (1HOUR)	The Noise Pollution (Regulation and Control) Act, 2000; Functions of Govt. Agencies for pollution control (CPCB & SPCB); The Factories Act, 1948; The Hazardous Wastes (Management and Handling) Rules, 1989
LECTURES	CONTENT
	PRACTICAL
LECTURE-19 (1HOUR)	Estimation of water parameters- pH, Temperature, conductivity, Turbidity, Dissolved Oxygen (DO), Alkalinity, Acidity, Hardness, Chloride Estimation of soil parameters- pH, Temperature, Bulk density, Soil porosity, Organic carbon
LECTURE-20 (1HOUR)	Air pollution- Temperature, Wind speed and direction; Relative humidity; Dust fall measurement Noise pollution- Measurement of noise level by dB meter in different zones
LECTURE-21 (1HOUR)	Field visit to a water treatment plant/ waste water treatment plant/ sewage treatment plant and preparation of visit report

LECTURE-22 (1HOUR)	Visit to a effluent treatment plants of Sugar industry/ Textile industry/ Dairy industry/ Iron-Steel plant industry/ Pharmaceutical industry/Thermal Power Plant industry
LECTURE-23 (1HOUR)	Estimation of BOD, COD, Phosphate, TDS, TSS from water samples
LECTURE-24 (1HOUR)	Submission of Project Report on Industry Visit
FIELD TRIP (VISIT TO ANY WATER/WASTE WATER TREATMENT PLANT + INDUSTRY VISIT) – 12HOURS	

V. EVALUATION POLICY FOR THE ADD-ON COURSE

The basic philosophy behind the Evaluation Policy for this 36 Hours Add-on Course is to objectively judge the participants (Students) whether the concepts were understandable to them or not and whether they could apply these concepts to solve conceptual problems. The Evaluation would be done through following ways:

- I. C1 - Module - end assignment/ Assessments (Blended) [Full Marks: 24]
- II. C2 - Course-end Assessment (Blended) [Full Marks: 40]
- III. C3 - Practical Note book submission + Field visit report submission +Project report submission [Full Marks: 26]
- IV. C4 - Attendance [Full Marks: 10]

Total Marks of the Evaluation Process would be 100

VI. STRATEGY OF ASSESSMENT AND EVALUATION MODALITIES FOR THE ADD-ON COURSE

MODULE-END ASSIGNMENTS/ ASSESSMENTS [C1]			
MODULE No.	MODULE NAME	MARKS	EVALUATION STRATEGY
MODULE 1	BASIC CONCEPTS OF ENVIRONMENTAL POLLUTION	04	BLENDED
MODULE 2	AIR AND NOISE POLLUTION CONTROL METHODOLOGIES	04	BLENDED
MODULE 3	INDUSTRIAL WASTE WATER POLLUTION AND WASTEWATER TREATMENT	04	BLENDED
MODULE 4	WASTE MANAGEMENT	04	BLENDED
MODULE 5	INDUSTRIAL POLLUTION PREVENTION AND CLEANER PRODUCTION	04	BLENDED
MODULE 6	ENVIRONMENTAL MANAGEMENT AND LEGISLATION	04	BLENDED
MODULE-END ASSIGNMENTS/ ASSESSMENTS [C1]		24	BLENDED
COURSE-END ASSESSMENT [C2]		40	BLENDED
PRACTICAL NOTE BOOK SUBMISSION + FIELD VISIT REPORT SUBMISSION + PROJECT REPORT SUBMISSION [C3]		26	BLENDED
ATTENDANCE [C4]		10	BASED ON TABLE (SECTION -VII)

VII. MARKING PROCEDURE FOR THE ATTENDANCE COMPONENT (C4)

Attendance Percentage = Total Number of Lectures attended by the Student Participant/ Total Number of

Lectures Held

TOTAL MARKS IN ATTENDANCE COMPONENT (C4) = 10

ATTENDANCE PERCENTAGE (%)	MARKS ALLOTTED
ABOVE 90	6
80-89	5
70-79	4
60-69	3
50-59	2
BELOW 50	NOT ELIGIBLE FOR CERTIFICATE

VIII. TABLE FOR QUALIFICATION

TOTAL SCORE (OUT OF 100)	GRADE
90-100	O - OUTSTANDING
80-89	E - EXCELLENT
70-79	A - VERY GOOD
60-69	B - GOOD
50-59	C - FAIR
BELOW 50	F- FAILED

IX. GENERAL RULES AND REGULATIONS

1. Students must attend and appear for the entire Module - End Assessments. If any student

fails to submit any of the Module-End assignments or Fails to attend any of the Module-End assessment Examinations, the particular student would **NOT BE ELIGIBLE FOR CERTIFICATE**.

2. Students must attend and appear for the entire Course - End Assessments. If any student fails to submit any of the Course-End assignments or Fails to attend any of the Module-End assessment Examinations, the particular student would **NOT BE ELIGIBLE FOR CERTIFICATE**.
3. Students must attend the Practical classes and Field visit and Industry visit and also submit the Field visit report and Project Report. If any student fails to attend the Practical classes or not submit their Field visit Report and Project Report, the particular student would **NOT BE ELIGIBLE FOR CERTIFICATE**.
4. Total Marks of Course Evaluation will be 100 Marks.
5. Minimum 50% Marks has to be scored to receive any CERTIFICATE. There will be only ONE Attempt allowed for each of the Module-End Assessments/ Assignments and the Course-End assessment.
6. There will be NO PROVISION for backlog Clearance.
7. General Rules and Regulations of the College must be followed without any exception.