QP Code: R253G063 | Reg. No | | | | | | | | | | | AY 24

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET UNIVERSITY)

M.Sc. (Third Semester – Regular) Examinations, December – 2025

24MCYPC23003 – Environmental and Analytical Chemistry

(Chemistry)

Time: 3 hrs | Maximum: 60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Name two major primary pollutants emitted by vehicles.	CO1	K1
b. What is eutrophication?	CO2	K1
c. What does a high value of electrical conductivity (EC) in water generally indicate?	CO3	K1
d. What is a hollow-cathode lamp used for in AAS instrumentation?	CO4	K1
e. Mention one industrial use of radio-isotopes.	CO5	K1

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. Explain what is meant by primary air pollutants. List the major primary pollutants (such as CO and NO_x) and discuss their main sources.	5	CO1	K3
b. Discuss the phenomenon of acid rain, its causes and environmental impacts.	5	CO1	K3
(OR)			
c. What are the key parameters and methods for sampling and monitoring the ambient concentrations of carbon monoxide and sulphur dioxide?	5	CO1	K3
d. Explain why aromatic hydrocarbons are problematic and outline how they are sampled and analysed in ambient air.	5	CO1	K3
3.a. Explain the chemical composition of a typical natural lake water and discuss how it may differ from that of a stream.	5	CO2	K2
b. Describe the major stages of the hydrological cycle and explain how human activities can alter one of these stages.	5	CO2	K3
(OR)			
c. Distinguish between groundwater and surface-water pollution in terms of sources, transport mechanisms and vulnerability.	5	CO2	K3
d. Outline the role of legislation or institutions in controlling water pollution in India (e.g., the Water (Prevention and Control of Pollution) Act, 1974).	5	CO2	K3
4.a. Explain the significance of measuring dissolved oxygen (DO), biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in assessing the quality of a river receiving municipal wastewater.	5	CO3	K3
b. Compare and contrast the concept of total suspended solids (TSS) and total dissolved solids (TDS) in natural and wastewater-impacted waters.	5	CO3	K3

(OR)

c.	Describe the role of fluoride in groundwater pollution contexts. Explain how excess fluoride can affect health.	5	CO3	K2
d.	Explain how alkalinity influences the buffering capacity of water bodies.	5	CO3	K2
5.a.	Explain the principle and instrumentation of Atomic Absorption Spectroscopy (AAS).	5	CO4	K3
b.	Compare and contrast Flame Emission Spectroscopy and Atomic Absorption Spectroscopy in terms of principle, instrumentation, sensitivity, and typical applications.	5	CO4	K2

(OR)

c.	Discuss the instrumentation of a fluorimeter. What factors influence its detection limit and sensitivity?	5	CO4	K2
d.	Explain the concept of the Stokes shift in fluorescence spectroscopy and discuss its significance in practical fluorimetric analysis.	5	CO4	K3
6.a.	Explain how radioisotopes are used to determine the solubility of a sparingly-soluble salt.	5	CO5	K3
b.	Describe how a radioisotope tracer can be used to measure the surface area of a powder or precipitate.	5	CO5	K2

(OR)

c.	Discuss the use of radioisotopes in dating (geological/archaeological) and in medicine.	5	CO5	K2
d.	What are the advantages of using radioisotopes as tracers in environmental or chemical systems?	5	CO5	K2

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