

M.Sc. ENVIRONMENTAL SCIENCE
First Semester
ENVIRONMENTAL CHEMISTRY
(MEV - 102)

Duration: 3Hrs.

Full Marks: 70

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

Answer any four from Question no. 2 to 8
Question no. 1 is compulsory.

1. What are different parameters of water quality? Write briefly about sources and impacts of any two physical water quality parameters. (3+7=10)
2. Define: (*any four*) (2.5×4=10)
 - i) Order of a reaction
 - ii) Redox reactions
 - iii) Chemical potential
 - iv) BOD
 - v) Indicator organisms
3. What is ozone hole? Discuss formation and depletion of Ozone in stratosphere. (2+8=10)
4. What do you mean by hardness of water? Write about sources, impacts and measurement of hardness in water. (2+2+3+3=10)
5. Tests for common ions are run on a sample of water and the results are shown below. If a 10 % error in the balance is acceptable, should the analysis be considered complete? (8+2=10)

Constituents

$\text{Ca}^{2+} = 60 \text{ mg/L}$

$\text{HCO}_3^- = 250 \text{ mg/L}$

$\text{Mg}^{2+} = 20 \text{ mg/L}$

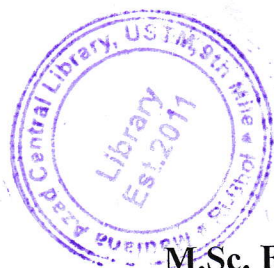
$\text{SO}_4^{2-} = 60 \text{ mg/L}$

$\text{Na}^+ = 92 \text{ mg/L}$

$\text{Cl}^- = 90 \text{ mg/L}$

Show the common ion balance in a bar diagram.

6. What are CFCs? Write the formula and IUPAC name of any two CFCs. What are the environmental impacts of CFCs? (2+4+4=10)
7. What is soil profile? Write about different physico-chemical properties of soil. (10)
8. Write short notes on: (*any two*) (5+5=10)
- a) Photochemical smog.
 - b) Atomic Absorption Spectrophotometry.
 - c) Beer- Lambert's law and its application in quantitative analysis.



M.Sc. ENVIRONMENTAL SCIENCE
First Semester
ENVIRONMENTAL CHEMISTRY
(MEV - 102)

Duration: 20 minutes

Marks – 20

(PART A - Objective Type)

I. Choose the correct answer:

1×17=17

- i) Tropospheric ozone
- Protects Earth from most of the harmful UV radiation.
 - Is a primary pollutant and prevents oxygen carrying capacity of blood.
 - Is produced through the interaction of heat and light, with nitrogen oxides and other carbon-containing compounds.
 - All of above.
- ii) Photochemical smog differs from classical smog in that it
- Is formed in the presence of sunlight.
 - Has large quantities of soot.
 - Is primarily composed of carbon monoxide.
 - Consists of primary pollutants.
- iii) Which of the following species is capable of functioning both as a Bronsted acid and Bronsted base?
- F^-
 - CO_3^{2-}
 - HS^-
 - S^{2-}
- iv) EDTA and EBT are used in measurement of
- Alkalinity
 - Acidity
 - Hardness
 - Concentration
- v) Apparent colour in water is due to
- Suspended matter
 - Dissolved solids
 - Total solids
 - Microorganisms
- vi) The maximum density of water occurs at
- $0^\circ C$
 - $4^\circ C$
 - $100^\circ C$
 - $104^\circ C$
- vii) Alkalinity is expressed as milligrams per litre of
- Calcium carbonate
 - Sodium hydroxide
 - Sulphuric acid
 - None of above
- viii) NTU is unit used in measurement of
- Colour
 - Turbidity
 - Odour
 - None of above

- ix) Molecular formula for PAN is
 a) RCO_3NO_2 b) RCO_2NO_2
 c) RCO_3NO_3 d) None of above
- x) Total suspended solids present in water is calculated by
 a) Titration b) Gravimetry
 c) Colourimetry d) None of above
- xi) Primary standards should not have the property
 a) Stability in air b) High purity
 c) High reactivity in air d) None of above
- xii) Which is not a water quality parameter?
 a) Permeability b) Porosity
 c) Soil water d) All of above
- xiii) XRD is used for
 a) mineralogical analysis of solid materials
 b) measurement of molecular weight distribution
 c) Imaging and elemental analysis of small areas of solid materials
 d) all of above
- xiv) The concentration of solid particles is done by
 a) Coagulation b) Filtration
 c) Chromatography d) All of above
- xv) Which of the analytical technique is based on absorption of visible light and UV light by solutions?
 a) Gravimetry b) Spectrophotometry
 c) Titrimetry d) Chromatography
- xvi) Which of the following radical is called the atmospheric detergent?
 a) Chloride radical b) OH radical
 c) Bleaching powder d) Ozone
- xvii) Dobson unit is a measure of concentration of
 a) PAN b) CFC c) Ozone d) PAH

II. Fill in the blanks:

1×3=3

- a) The multivalent metallic ions most abundant in natural waters are calcium and
- b) Concentrations of approximately mg/L Fluoride in drinking water help to prevent dental cavities in children.

c) Scattering of light by colloidal particles is called Effect.
