

2024

## ENVIRONMENTAL SCIENCE — HONOURS

Paper : DSCC-3

(Environmental Chemistry)

Full Marks : 75

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer the following questions :

1×10

- ✓(a) What do you mean by normal solution?
- ✓(b) Calculate the molecular weight of calcium carbonate. (Ca = 40, C = 12, O = 16)
- ✓(c) Give an example of Chelating agent.
- ✓(d) Give two examples of ozone depleting substances.
- ✓(e) Give an example of an acid-base neutralization reaction.
- ✓(f) Name two coagulants.
- ✓(g) Give an example of a reversible reaction.
- ✓(h) What do you mean by Equilibrium constant?
- ✓(i) What is Avogadro Number?
- ✓(j) Write the full form of VOC.

2. Answer *any five* questions :

2×5

- ✓(a) What do you mean by auto-ionization of water?
- (b) What do you mean by electrochemical cells?
- ✓(c) What is Tyndall effect?
- ✓(d) Calculate the amount of NaCl required to prepare 250 ml of 0.5(N) NaCl solution.  
(Na = 23; Cl = 35.5)
- ✓(e) Distinguish between Molar and Molal solution.
- (f)  $2\text{NaI} + \text{Pb}(\text{NO}_3)_2 = \text{PbI}_2 + 2\text{NaNO}_3$  — Identify oxidant and reductant in the reaction.
- ✓(g) State Le Chatelier's principle.

Please Turn Over

(1605)



3. Write short notes on *any three* :

- ✓(a) Soil humus
- ✓(b) Bohr's postulates on atomic structure
- ✓(c) Mechanism of ozone layer depletion
- ✓(d) Chemical equilibrium – a dynamic process
- (e) Green synthesis.

4. Answer *any four* questions :

- (a) Briefly discuss nitrogen fixation process in soil. State the importance of potassium in soil. Mention the sources of phosphorus in soil. 4+3+3
  - ✓(b) What are soil colloids? Describe the cation and anion exchange reactions in soil. Name two organic and inorganic components in soil. 3+5+2
  - (c) What do you mean by alkalinity and acidity of water? Describe the process of assessing hardness of water. How can you differentiate between temporary and permanent hardness? 4+4+2
  - ✓(d) What are particulate matters? Briefly comment on the  $\text{NO}_x$  and  $\text{SO}_x$  chemistry. What is aerosol? 3+5+2
  - ✓(e) Distinguish between electron affinity and electronegativity. What do you mean by hydrogen bond? Describe the mole concept. 4+3+3
  - ✓(f) Elaborate the concept of Atom economy. Comment on the use of  $\text{H}_2\text{O}_2$  as being bleaching agents in paper industry. 5+5
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2022 - ①

AA, DB, CD

B(3rd Sm.)-Environmental Science-H/DSCC-4/CCF

2024

## ENVIRONMENTAL SCIENCE — HONOURS

Paper : DSCC-4

(Environmental Physics and Climate Science)

Full Marks : 75

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

1. Answer the following questions :

1×10

- ✓(a) What do you mean by 'Black body' radiation?
- ✓(b) What is convective heat transfer process?
- ✓(c) Define Emission Spectrum.
- ✓(d) Define Coriolis force.
- ✓(e) What do you mean by viscosity?
- ✓(f) Define Albedo.
- ✓(g) What is dew point?
- ✓(h) Define climate.
- ✓(i) What do you mean by Mixing depth?
- ✓(j) State the formula of Carnot efficiency.

2. Answer the following (*any five*) :

2×5

- ✓(a) What do you mean by Solar Constant?
- (b) What is free energy? What are its two types?
- ✓(c) Define wet adiabatic lapse rate.
- ✓(d) What do you mean by absolute humidity and relative humidity?
- ✓(e) Define entropy and enthalpy.
- ✓(f) Write the working principle of Carnot engine.
- (g) What is Circulation Gyre?

3. Answer *any three* short notes :

5×3

- (a) Optical properties of atmosphere
- ✓(b) Köppen' climate classification

Please Turn Over

(1606)



✓(c) La Nina and Global climate pattern

(d) Global conveyor belt

✓(e) Earth's energy budget.

4. Answer *any four* questions :

✓(a) What factors affect the scattering of light? Explain the concept of light as wave. Derive the relationship between pressure, volume and temperature for an ideal gas using the gas laws.

2+2+6

✓(b) What is subsidence inversion? Explain its role in air pollution dispersion. What is the role of the Gaussian Plume Model in pollutant dispersion studies?

2+4+4

(c) Explain the concept of Enthalpy and Gibbs free energy in relation to thermodynamics.

5+5

✓(d) Briefly describe Western disturbance in India. Establish a comparison between cyclone and anticyclone.

5+5

✓(e) What is ENSO? How is it predicted? What is langmuir circulation?

5+2+3

✓(f) Explain the onset of Indian monsoon with proper diagram. Explain the role of IOD (Indian Ocean Dipole) in Indian monsoon.

5+5



2024

## ENVIRONMENTAL SCIENCE — HONOURS

Paper : SEC-3

(Green Technology)

Full Marks : 100

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*1. Answer **all** questions :

1×10

- ✓(a) Why is waste minimization favoured over waste recycling?
- ✓(b) What is the concept of green city?
- ✓(c) What is Fluidization?
- ✓(d) Give one example of environment friendly technology.
- ✓(e) What is IGBC?
- ✓(f) What do you mean by bio-accumulative products?
- ✓(g) What are VOCs?
- ✓(h) What is flue gas?
- ✓(i) What is syngas?
- ✓(j) What is organic agriculture?

2. Answer **any ten** questions :

2×10

- ✓(a) What is green nanotechnology?
- (b) Define Ecological Overshoot.
- ✓(c) What is photo-degradable plastic?
- ✓(d) Write the significance of wet-scrubbers.
- ✓(e) What are green buildings?
- ✓(f) Give significance of Oxy-fuel firing.
- ✓(g) What do you mean by 'ecological footprint'?
- ✓(h) Name two green practices to conserve the natural resources.
- ✓(i) What do you mean by Green Belts?
- (j) Write in brief the challenges faced by green technologies.



- ✓(k) How does public transport promote sustainable development?
- ✓(l) Give two examples of sustainable practices in urban planning for a green city.
- (m) What is green reaction? Give an example.
- (n) What is solvent recovery?

3. Write short notes on *any four* :

5×4

- ✓(a) Reduction of Ecological Footprint
- ✓(b) Green Chemistry and Sustainable Future
- ✓(c) Carbon Capture and Storage Technologies
- ✓(d) Agroforestry
- (e) Role of informal sector in waste management
- (f) Waste to energy technologies.

4. Answer *any five* questions :

- ✓(a) What is the main purpose of Flue-Gas Desulfurization (FGD) process? Explain Wet FGD using a suitable diagram. 2+8
- ✓(b) What are the benefits of green building? Explain factors considered for construction of green building. 2+8
- (c) Name two sources of dioxin in the environment. How can dioxins be reduced and removed from the environment? Briefly state the adverse impact of dioxin on the environment. 2+6+2
- ✓(d) Suggest few ways towards waste minimization. Discuss in brief strategies of public transportation towards the attainment of sustainable goals. 3+7
- ✓(e) Explain Fluidized Bed Combustion (FBC) operation with a schematic diagram. What are the advantages of FBC? 7+3
- ✓(f) What is the principle of Compact Fluorescent Lights (CFLs)? How is cogeneration related to energy efficiency? Discuss in brief isothermal melting process and energy efficient fume hoods. 3+3+4
- (g) Why do VOCs raise environmental concern? Mention the advantages of low VOC paints. Enumerate the principle of thermal oxidizer with a schematic diagram. 2+2+6
- ✓(h) Write in brief the role of government in green planning. Green buildings are significantly more relevant than conventional buildings — Justify. Define circular economy. 4+4+2