

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M.Sc./PRE-PHD
BRANCH: ENVIRONMENTAL SCIENCE & TECHNOLOGY

SEMESTER : I
SESSION : MO/2025

SUBJECT: MET25502 ENVIRONMENTAL CHEMISTRY & MICROBIOLOGY

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

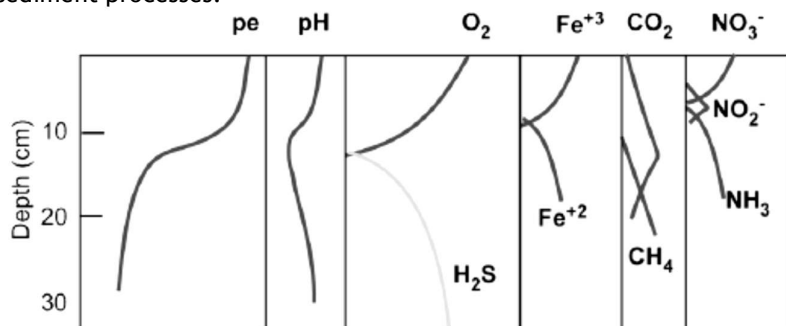
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

- | | | CO | BL |
|---|-----|----|----|
| Q.1(a) Describe the reaction kinetics with reference to different environmental systems. | [5] | 1 | 2 |
| Q.1(b) Explain the various types of environmental transformation and degradation processes. | [5] | 1 | 2 |

- Q.2(a) Water from a lake has a chemical composition as given below. If humic matter concentration in water is 10 mg/L, examine the charge balance and the significance of humic material. [5] 3 4

H^+ = pH 6.0 Ca^{2+} = 0.6 mg/L Mg^{2+} = 0.2 mg/L Na^+ = 0.08 mg/L K^+ = 0.06 mg/L NH_4^+ = 0.056 mg/L	HCO_3^- = 0.02 mg/L (as C) SO_4^{2-} = 0.06 mg/L (as S) Cl^- = 0.2 mg/L NO_3^- = 0.07 mg/L (as N)
--	--

- Q.2(b) Using the profiles given in the diagram, analyse the conditions these data indicate about sediment processes. [5] 2 4



- | | | | |
|--|-----|---|---|
| Q.3(a) Identify the various reactions that neutralize soil acidity. | [5] | 2 | 3 |
| Q.3(b) Distinguish between AAS and ICP-OES for water analysis. | [5] | 3 | 4 |
| Q.4(a) Compare between a batch mode system and continuous mode system of bacterial growth. | [5] | 1 | 4 |
| Q.4(b) Explain the process to analyze the fecal coliforms in drinking water | [5] | 3 | 2 |
| Q.5(a) Compare the aerobic and anaerobic process for wastewater treatment. | [5] | 2 | 4 |
| Q.5(b) Explain the <i>in-situ</i> methods for bioremediation of groundwater and soil. | [5] | 2 | 2 |