

[This question paper contains 4 printed pages.]

3050

Your Roll No. ....

MEC

J

Paper – CE.505

ENVIRONMENTAL CHEMISTRY AND  
MICROBIOLOGY

Time : 3 hours

Maximum Marks : 100

*(Write your Roll No. on the top immediately  
on receipt of this question paper.)*

*Q. No. 1 is compulsory.*

*Answer any five questions from the remaining.*

1. Fill in the blanks with appropriate words/sentences/  
expressions/figures.
  - (a) A litre of solution contains 100 mg of HCl, the pH  
after addition of 2 ml 1N NaOH will be \_\_\_\_\_
  - (b) The classification of algae is based on \_\_\_\_\_  
whereas for Protozoa the various grouping are  
based on \_\_\_\_\_
  - (c) The percentage ionisation of .01 M  $\text{H}_2\text{CO}_3$  solution  
at 25°C is \_\_\_\_\_.

Given :  $K = 4.45 \times 10^{-7}$ , At.wt of H = 1, C = 12,  
O = 16.

P.T.O.

- (d) The knowledge about living organisms is obtained through following Properties \_\_\_\_\_
- (e) The following virus, bacteria & Protozoa & Parasites are responsible for water borne diseases named against each organism \_\_\_\_\_
- (f) Bacteria is classified as \_\_\_\_\_, fungi & blue green algae are \_\_\_\_\_. Fungi differs from bacteria in following respects \_\_\_\_\_.
- (g) \_\_\_\_\_ are indicator organisms for checking contamination of water. The ideal indicator organism should satisfy the following criteria \_\_\_\_\_
- (h) Psychrophilic bacteria grow in \_\_\_\_\_ temperature environments, whereas mesophilic & thermophilic grow in temperature ranges \_\_\_\_\_.
- (i) The shape & arrangement of spherical cells such as Cocci, Sarcinae, Streptococci and Staphylococcus are the following \_\_\_\_\_.
- (j) In a particular year, the world wide fossil fuel energy consumption was  $3 \times 10^{20}$  J/year. If all the energy is assumed to be supplied by  $\text{CH}_4$  gas having energy equivalent  $3.9 \times 10^7$  J/m<sup>3</sup> (At STP). The emission rate of  $\text{CO}_2$  on burning methane will be \_\_\_\_\_ g/year. (10×2.5=25)

2. (a) Discuss in details the different layers of atmosphere.
- (b) What do you know about ozone hole? Discuss the various chemical reactions responsible for ozone hole.
- (c) Discuss the role of various green house gases in global warming. Give the mechanism involved.  
(3+6+6=15)
3. (a) Classify various pesticides. How do different pesticides differ in their degradation mechanism?
- (b) How can we use oxidation & reduction for Industrial water pollution control? Give atleast three examples with illustrative chemical reactions.  
(7+8=15)
4. Write notes on :
- (a) Environmental problems due to trace organics.
- (b) Problems due to Phosphate substitutes in the detergent for mutations.  
(7+8=15)
5. (a) What are the problems associated with the usage of Plastics in Packaging of food etc.? What are the environmental issues associated with disposal of Plastics?

- (b) What is the importance of toxicology for environmental Engineers ? Discuss. (8+7=15)
6. (a) What are the environmental problems caused due to heavy metals like Hg, AS, Pb, Cr, Cd etc.
- (b) What are ocean oil spills ? Give the ecological problems associated with oil spills ? Describe the fate of oil spill in the ocean environment.  
(7+8=15)
7. (a) What is Henry's law ? What is its importance in the control of  $\text{CH}_4$ ,  $\text{H}_2\text{S}$ ,  $\text{CO}_2$  &  $\text{NH}_3$  in natural waters ?
- (b) Discuss the symbiotic relationships in oxidation ponds. (8+7=15)
8. Write notes on :
- (i) Microbiology of activated sludge process
  - (ii) Distribution of various microbes in a Trickling filters
  - (iii) Nutritional Catagonisation of bacteria (5×3=15)