

M. Sc. CHEMISTRY
SCHOOL OF CHEMICAL AND LIFE SCIENCES
SEMESTER III EXAMINATION 2019
PAPER TITLE: ENVIRONMENTAL CHEMISTRY
PAPER CODE: MCHOE-307

Write your roll no. at the top immediately after receipt of this question paper

Time: 3 h

Max. Marks: 75

Attempt all questions. All parts of a question must be attempted in continuation.
Start answer of a fresh question on a new page.

Q1. Answer ALL questions.

15 x 1 = 15

- (i) What are dispersion aerosols?
- (ii) Total mass of atmosphere is approximately _____ metric tons and is about _____ of earth's total mass.
- (iii) Freshly fallen snow has an albedo of _____% whereas freshly plowed black topsoil has an albedo of _____%.
- (iv) What is the source of faint electromagnetic radiation (air glow) continuously emitted by the earth's atmosphere?
- (v) Name four major gases which contribute to Green house effect.
- (vi) What is pea soup fog? Where does it occur?
- (vii) What is COD of water?
- (viii) Cyanide, a deadly poisonous substance, exists in water as _____ which is very toxic and has been used in _____.
- (ix) What is DDT and what is the substitute for DDT?
- (x) What do you understand by PM 2.5 in air pollution?
- (xi) What were the cause and consequence of Michigan PBB incident?
- (xii) List at least four uranium producing regions of the western U.S.
- (xiii) The maximum contaminant level (MCL) for total radium in drinking water specified by United States-EPA is _____ per liter.
- (xiv) Water used in paper industry should be free from _____ as it produces _____ in the paper.
- (xv) Name two coagulants most often used in water treatment.

Q2. Answer ANY THREE of the following:

3 x 5 = 15

- A. Describe the stratification of atmosphere with relevant line drawings.
- B. How is ozone layer formed in the stratosphere? What is the function of ozone layer?
- C. Describe the involvement of hydroxyl radical in chemical transformations of trace species in the atmosphere.
- D. Write short notes on atmospheric water.
- E. Draw and explain oxygen cycle.

Q3. Answer ANY THREE of the following: **3 x 5 = 15**

- A. Describe the effects of atmospheric sulfur dioxide. Describe some means of SO₂ removal.
- B. Explain the mechanism of action of freons and halons on ozone layer.
- C. Describe the industrial uses of organo tin compounds.
- D. Write short notes on poisoning by heavy metals such as Hg, Cd and Pb.
- E. In which cities were asbestos fibers found in drinking water? How was this water pollution tackled?

Q4. Answer ANY THREE of the following: **3 x 5 = 15**

- A. How will you determine the total coliform in the given sample of water?
- B. Describe briefly the determination of alkalinity of water. What are the conclusions derived from the volumetric results.
- C. Write short notes on organophosphate insecticides.
- D. Draw and explain the activated sludge process of waste water treatment.
- E. Describe the removal hardness of water by ion exchange resins.

Q5. Answer ANY THREE of the following: **3 x 5 = 15**

- A. What are the dissolved organics generally found in waste water? How are they removed?
- B. Describe the bulk removal of dissolved inorganics and heavy metal ions from water by reverse osmosis.
- C. Display the various waste water producing steps from pulp and paper mill.
- D. What are various gas emissions from thermal power plant? How can they be eliminated from the atmosphere?
- E. Describe chemical pulping and pulp bleaching steps involved in the production of paper.

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