[190] SEAT No._____

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(190) SARDAR PATEL UNIVERSITY

M.Sc.(Analytical Chemistry) **IV^th** Semester **Examination** (CBCS)

March-2019

Tuesday, **Date:** 26.03.2019

Time: 2.00 p.m. to 5.00 p.m., **Paper:** PS04EANC21

Subject: Environmental chemistry and analysis, **Max. Marks:** 70

N.B.: i) The numbers of the marks carried by each question is indicated at the end of the question
ii) Assume suitable data if considered necessary and indicate the same clearly.

Q.1 Attempt MCQs below, with the correct choice highlighted [08]

i) Precipitation is one of the components of.....
a) Oxygen cycle **b)** Nitrogen cycle
c) Hydrological cycle **d)** Sulfur cycle

ii) Key component(s) of physical weathering process include(s)
a) Water **b)** Ice
c) Temperature **d)** All

iii) Ecosystem is a small unit of.....
a) Lithosphere **b)** Hydrosphere
c) Atmosphere **d)** Biosphere

iv) The atmospheric window covers the region of IR...
a) 8–13 μm **b)** 8000–13000 nm
c) 0.08–0.13 μm **d)** Both a) and b)

v) An air pollutant that librates $I_2(g)$, and forms KOH and oxygen with KI solution is...
a) Ozone **b)** Carbon dioxide
c) Oxygen **d)** Sulphure dioxide

vi) Identify terms used for wastes....
a) Trash **b)** Refuse
c) Both a) and b) **d)** PAH

vii) Industrial FGDS sludge is used to trap mainly ....
a) $CO_2(g)$ **b)** $O_2(g)$
c) $SO_2(g)$ **d)** $N_2(g)$

viii) Method(s) considered suitable for solid waste treatment include(s)
a) Incineration **b)** Pulverization
c) Both a) and b) **d)** None

Q.2 Attempt any ***Seven*** [14]

i) If 28, 32, 39.95 and 44 are molecular weights (in g/mol) of $N_2(g)$, $O_2(g)$, Ar(g) and $CO_2(g)$ respectively, present in the air, calculate average molar mass of the atmosphere.
ii) State the term 'water logging' and its impacts on soil.
iii) Illustrate terms 'bio-concentration' and 'bio-magnification'.
iv) State 'impinger' and its role in air analysis.
v) Distinguish between London Smog and Los Angeles Smog.
vi) Describe in brief 'concentration window' with suitable examples.
vii) State 'soil pollution' and give account of causes for this situation.
viii) State the terms DO, BOD and COD.

(P.T.O.)

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ix) Show the mechanism of Acetylcholinesterase inhibition by carbamate insecticide

Q.3

a) What do you understand by the atmosphere? Write a note on concentric layers of the atmosphere. [06]

b) Outline [06]

i) Effect of water vapor in the air

ii) Microbially mediated redox processes in water

OR

b) What do you mean by 'NOx'? Give key reactions associated with sources and sink of NOx.

Q.4

a) Describe water pollution. List the toxic elements in water, along with their sources, and the types of toxic effect they reveal [06]

b) Write a note on ozone depletion [06]

OR

b) State 'green house effect'. Name green house gases, and show their relative contributions to this effect. Discuss impacts of this effect.

Q.5

a) Illustrate sampling train for the air sample. A 27 L air sample was collected and absorbed in KI solution, for $Cl_2(g)$ determination. The librated $I_2(g)$ required 30.24 mL of 0.1018 M $Na_2S_2O_3$ solution in the titration. Calculate the concentration of Cl_2 gas in ppm in the sample.[MW of $Cl_2(g)$= 71(g/mole)] [06]

b) Write a note on SO_2 detection and determination in the air. [06]

OR

b) List the pollutant gases. Describe common analysis methods for monitoring of these species in the air.

Q.6

a) Write a note on green chemistry principles. [06]

b) Describe MSW, BSW, and ISW, and their disposal strategies in general. [06]

OR

b) Discuss various sources of solid wastes. Write a note on incineration of MSW.

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