Exam Date & Time: 11-May-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

IV SEMESTER B.TECH. (CHEMICAL ENGINEERING)
END SEMESTER EXAMINATIONS, May 2024

POLLUTION CONTROL AND SAFETY IN CHEMICAL INDUSTRY [CHE 2224]

Marks: 50 **Duration: 180 mins.**

Part - A

Answer all the questions. Section Duration: 180 mins

Answer ALL the questions.
Missing data may be suitably assumed.

1) The wastewater has a BOD_5 equal to 180 mg/l and a reaction rate k equal to 0.22/day. It also has a Total Kjeldahl Nitrogen content (TKN) of 30 mg/l.

1A) (i)Find the ultimate carbonaceous oxygen demand (CBOD)
(ii)Find the ultimate nitrogenous oxygen demand (NBOD)
(iii)Find the remaining BOD after 5 days have elapsed (3)

1B) Examine the different types of particulates with an example of each. (3)

1C) Evaluate and suggest remedial measures for seven major pollutants for which maximum ambient air quality levels are mandated. (4)

2) Classify the sources, effects and preventive techniques of Radioactive pollution. (3)

2A)

2B) Analyse the different gaseous pollutant sources, characteristics and control measures for the same. (3)

2C) Examine water cycle and carbon cycle. (4)

3) Explain the importance of measurement of fixed solids, volatile solids and total solids in industrial wastewater. (3)

3A)

3B) Enumerate the benefits of hazard analysis? Give a suitable case study for the same. (4)

3C) Compare dry collector and wet collectors for air pollution control along with its advantages and disadvantages. (3)

4) Explain environmental problems and health risks caused by hazardous wastes. (3)

4A)

4B) A single source of BOD causes an oxygen-sag curve with a minimum downstream DO equal to 6.0 mg/l. If the BOD of the waste is doubled (without increasing the waste flow rate), what would be the new minimum downstream DO? In both cases assume that the initial oxygen deficit just below the source is zero and the saturated value of DO is 10.0 mg/l. Note that when the initial deficit is zero, the deficit at any point is proportional to the initial BOD. (3)

4C) Explain the following terminologies (4)
(a)Adiabatic lapse rate

(b)Atmospheric stability
(c) Different types of plumes

5) Evaluate the role of an individual in pollution prevention? Explain the initiatives adopted for reduction in pollution. (3)

5A)

5B) Explain in detail about Material Safey Data Sheet (MSDS) and its different sections. (4)

5C) Compare sloughing and bulking. (3)

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