M.Sc. DEGREE II SEMESTER EXAMINATION IN ENVIRONMENTAL TECHNOLOGY APRIL 2011

ENV/ENB 2202 ENVIRONMENTAL ENGINEERING

Time: 3 Hours   Maximum Marks : 50

PART – A
(Answer *ANY FIVE* questions)
(All questions carry *EQUAL* marks)

(5 x 2 = 10)

I.   (a)   The Environment (Protection) Act, 1986 is often referred to as an 'umbrella' act. Why?

      (b)   Give an example for the application of chemical precipitation for the removal of pollutants from waste water.

      (c)   Differentiate between 'mean cell residence time' and 'hydraulic retention time'.

      (d)   Define 'environmental lapse rate' and 'adiobatic lapse rate'.

      (e)   Name the factors which influence the collection efficiency of an electrostatic precipitator.

      (f)   What are the advantages of a sanitary land fill over an open dump?

      (g)   How is catalytic oxidation used for the control of ventricular pollution?

      (h)   What do you mean by endogenous respiration?

PART - B
(Answer *ANY FIVE* questions)
(All questions carry *EQUAL* marks)

(5 x 4 = 20)

II.   (a)   What are the functions of state pollution control boards as per Water (Prevention and Control of Pollution) Act and Air (Prevention and Control of Pollution) Act?

      (b)   What are the commonly used methods of disinfection in water treatment? Do these methods pose any health risk in the long run?

      (c)   A waste water contains ammoniacal nitrogen. Suggest a biological process for the removal of nitrogen from this waste water.

      (d)   What are green house gases? How do they contribute to climate change?

      (e)   How does a wet scrubber remove particulates from gaseous streams? What are the major types of scrubber designs?

      (f)   What are the merits and demerits of incinerators?

      (g)   Explain briefly the causes and effects of noise pollution.

      (h)   What is the purpose of filtration? State typical characteristics of rapid sand filters.

PART - C
(Answer *ANY FOUR* questions)
(All questions carry *EQUAL* marks)

(4 x 5 = 20)

III.   (a)   Determine the surface area of the settling tank for $0.5 m^3/sec$ design flow using the design overflow rate of $32.5 m^3/m^2/day$. Find the depth of the tank for the overflow rate and detention time of 95 minutes.

      (b)   What is meant by activated sludge? List the advantages and disadvantages of the activated sludge process.

      (c)   The exhaust gas from a motor vehicle shows a carbon monoxide concentration of 2 per cent by volume. What is the concentration of CO in mg/m^3 at 0^0C and 1 atm?

      (d)   With the help of a neat sketch, explain the upflow anaerobic sludge blanket (UASB) reactor technique for treating municipal waste water.

      (e)   Explain the mechanisms for particle separation in a fabric filter. What are the advantages of a fabric filter?

      (f)   State the reasons that good compost is beneficial for crop production. What are the process parameters of composting? Explain the role of C/N ratio in composting.

      (g)   Discuss the national ambient air quality standards for the management of primary pollutants in urban areas.

      (h)   A 10^6 litres/day conventional activated sludge plant has an influent BOD of 200mg/l. The primary settling tank removes 30% of that BOD. The plant is equipped with an aeration tank 18m long x 5 m wide x 3m deep. The mixed liquor volatile suspended solids (MLVSS) concentration is maintained at 1600 mg/l. Calculate the aeration period.

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