M.Sc. DEGREE II SEMESTER EXAMINATION IN
ENVIRONMENTAL TECHNOLOGY
JUNE 2003

ENV2202 ENVIRONMENTAL ENGINEERING

Time : 3 Hours Maximum Marks:50

PART - A

(Answer ***ANY FIVE*** questions)
(All questions carry ***EQUAL*** marks) (5 x 2 = 10)

I. (i) What are the different physical properties of waste water?
(ii) Define Bio-chemical Oxygen Demand ($B.O.D_5$, day 20°C)
(iii) What is sludge re-cycling in activated sludge plant?
(iv) What is meant by 'effective' stack/chimney height?
(v) Write down the formula for terminal velocity in a settling tank. Mention the constituents and constants.
(vi) Explain 'Vermiculture' in waste treatment.

PART - B

(Answer ***ANY FIVE*** questions)
(All questions carry ***EQUAL*** marks) (5 x 3 = 15)

II. Explain 'Weir' loading rate of a settling/sedimentation tank. Express its unit.

III. Explain 'Adiatic' lapse rate using graphical representation (not to scale). What is meant by 'environmental' lapse rate?

IV. What is meant by 'stratification' of water bodies? Explain its consequences to environment

V. Which is the main source of 'carbon monoxide' (Co) from 4 stroke automobile engines? Justify its reason and express the Indian standrad.

VI. Explain the phenomenon of 'Trapping' plume with the help of graphical representation (not to scale). Compare stack/cheminey effective height and GLC.

VII. A. What is 'wind-rose' diagram? Show a typical wind-rose diagram assuming own values and not to scale. Explain the importance of it in air pollution monitoring and episode investigation.

OR

VII. B. Explain the procedure for locating an ambient air monitoring station for source monitoring of an industrial stack/chimney. Express the C.P.C.B standard of sulphur dioxide for industrial and residential area.

PART - C

(Answer ***ANY FIVE*** questions)
(All questions carry ***EQUAL*** marks) (5 x 5 = 25)

VIII. A. What is meant by 'Bag Filter' in air pollution control? Explain the working of a 'bag house' assembly. Explain the term 'Inside out' in a bag filter.

OR

VIII. B. Find out the dimension of an aeration tank of an 'activated' sludge plant for a township with the following details:

Population	:	100000 persons.
Per capita sewage	:	150 litres/day

Assume 'Hydraulic Retention Time' (HRT) as 360 minutes and assume appropriate ideal depth.

IX. A. Explain the method of monitoring of "Suspended Particulate Matter" and "sulphur dioxide" in ambient air. Differentiate between a 'buoyant' plume and 'momentum'plume.

OR

IX. B. A sulphuric acid plant is using 70 tonnes per day of sulphur for manu facturing sulphuric acid. Stack/chimney height proposed by the industry is 65 metres and the wind velocity at this height is 0.9 m/sec. where as wind at ground level is 0.55 m/sec. The industry is not intending to provide any air pollution control equipments. A tourist resort is pro-

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posed at 3.5 km. down wind where the maximum allowed GLC of sulphur dioxide is 30 microgram/cu.m. Using adequate equations find out whether the stack/chimney height proposed by this industry is sufficient. Take wind velocity at stack/chimney height for calculations.

$$\Delta H = 22m,\ \sigma y = 101m,\ \sigma z = 101m.$$

X. What are the three major methods of disposal of municpal solid waste? Explain briefly one among them. A village has clustered settlements of farmers. Vehicle facilities are remote and atmospheric inversion levels are high. Suggest a suitable method of solid waste disposal. Justify your suggestions.

XI. Explain the working of a sewage treatment plant based on activated sludge with neat line sketch explaining functions of each unit and showing directions of flow. Sewage is having dirt, floating matter and high oil content.

XII. A. Sketch and describe the principle of operation of settling chamber in particulate matter control. Mention the diffeent and important design parameters.

OR

XII. B. Explain the different disinfection methods for waste water treatment. Explain break point reaction in chlorination.

XIII. Write short notes on ***ANY FIVE*** of the following:-

(i) Dissolved oxygen.
(ii) Ozonation.
(iii) Conductivity as a parameter.
(iv) Re-oxygenation of streams.
(v) Indicators of Eutrophication.
(vi) Ion-Exchange in waste water treatment.
(vii) Anaerobic lagoons - Merits and demerits.

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