Total number of printed pages – 7 B.Tech/B.Pharm

HSSM 4403/PH.7.7

Seventh Semester Examination – 2008

ENVIRONMENTAL ENGINEERING

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any five from the rest.

The figures in the right-hand margin indicate marks.

1. Explain the following questions in *three - four* sentences : 2×10

   (i) Explain the term biodiversity with an example.

   (ii) Enlist four Indian environmental Laws

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enacted exclusively for the protection of environment.

(iii) Explain the hydrological cycle with a labeled diagram.

(iv) Give a comparative scaling in decibels (dB) of the following noise creating components

(a) Jet plane (b) street traffic (c) Rock music.

(v) Differentiate BOD with COD and give the relation between them.

(vi) Why are you using ULP in your petrol driven vehicles ?

(vii) Why rapid sand filters are suitable for coagulated water in the water treatment system ?

(viii) What is sludge volume index (SVI) and where it is used and mention its suitable range of values.

(ix) What is fugitive emission and explain with suitable examples ?

(x) Explain and differentiate the following terms

(a) Environmental impact analysis

(b) Environmental impact statement.

2. (a) Explain the detritus / decomposer food chain with a diagram and also draw the flow diagram of the carbon geochemical cycle ? 3+3

(b) Given concentration of Ca^{2+} as 90 mg/L in a solution, express the concentration in equivalents per litre, mill-equivalents per litre and mg/L as Ca CO_3. 4

3. (a) Define and explain briefly (two sentences) the procedure of measurement of the following types of solids occurred in the water systems. 5

(i) Total solids

(ii) Total Suspended solids

(iii) Total dissolved solids

(iv) Total volatile solids

(v) Total fixed solids.

(b) An industry discharges its treated effluent with a flow rate of 1 m^3/sec into a river which has a flow rate of 250 m^3/sec. If the BOD of the river background is 1.5 mg/L, determine the maximum BOD of the effluent discharge if the river should not be greater than 1.7 mg/L. 5

4. (a) A BOD test is conducted taking 5% waste-water mixed with 95% aerated water for the dilution and the following observations were taken

(i) DO of the aerated water used for dilution = 3.6mg/L

(ii) DO of the original waste water sample = 0.8 mg/L

(iii) DO of the diluted water after incubation at 20°C for 5 days = 0.7mg/L.

Compute the 5 day BOD of the above waste water sample if the de-oxygenation constant is 0.11. 5

(b) Explain the term energy budget with a diagram showing the relative distribution of solar energy in terms of percentage. 5

5. (a) Differentiate between : 2+2+2

(i) Ambient and Adiabatic Lapse Rate

(ii) Primary and secondary pollutants

(iii) Criteria and non-criteria Pollutants.

(b) What are the different methods used to attenuate the noise pollution ? 4

6. (a) Explain the working principle of activated sludge process (ASP)with the help of a flow diagram. 6

(b) Give a composition of municipal solid waste (MSW). 4

7. (a) Give a suitable definition of hazardous waste and enlist two sources of generation of these wastes. 4

(b) Show the step by step process to be used in the waste reduction techniques with the help of a flow chart. Discuss three benefits of waste minimization. 6

8. Write short notes on (any *four*) 2.5 × 4

(a) Leachate and landfill gas

(b) Flue gas Desulphurization

(c) Screening process in EIA

(d) Electro static precipitator (ESP)

(e) Life cycle assessment (LCA).