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Total number of printed pages – 3

B. Tech
HSSM 3402

Eighth Semester Regular / Back Examination – 2015

ENVIRONMENTAL ENGINEERING

BRANCH(S) : CSE, FASHION, IT, MECH, MM, MME, TEXTILE

QUESTION CODE : J 107

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. Answer the following questions :

2 × 10

- Name the three biotic components of an ecosystem.
- Write the environmental importance of nitrogen cycle.
- What are different types of alkalinities ? The pH of a given water sample is 7.6. Find out the noncarbonated alkalinity in mg/L as CaCO_3 .
- Mention the drinking water quality standard (IS10500) both desirable and permissible for colour and fluoride.
- Differentiate between batch reactor and flow reactor.
- What are the four types of equalization in waste water pre treatment ?
- Calculate the Combustion Efficiency of an incinerator where the outlet gas concentration for CO is 0.1% and inlet CO_2 is 25.8%.
- Enlist the important properties of hazardous wastes.
- Explain the sound pressure level and its unit.
- Differentiate between Lifecycle Assessment (LCA) and Environmental Impact Assessment (EIA).

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2. Give a classification of types of ecosystems with suitable examples. Explain the energy flow in an ecosystem as an ecosystem process with the help of an energy flow model. 10
3. Explain the concept of source-path-receiver with respect to noise pollution. If the average day time noise power level in an industrial area is 67-dB and night time noise power level is 55 dB, find out the equivalent noise power level in that area. Assume day time as 6 AM- 9 PM and night time as 9 PM - 6 AM. 10
4. (a) Discuss the operation of nitrogen cycle in nature involving the important steps in it. 5
- (b) Mention the various environmental laws which have been enacted in our country to tackle environmental pollution. Name the statutory bodies dealing with various environmental laws in our country. 5
5. (a) Explain the chlorine demand and break point chlorination with the help of a graph. Write the advantages and disadvantages of use of chlorine as a disinfectant. 5
- (b) Compute the total carbonate and non-carbonate hardness of a water sample having the following analysis report;
Calcium as $\text{Ca}^{2+} = 80 \text{ mg/L}$
Magnesium as $\text{Mg}^{2+} = 36 \text{ mg/L}$.
Sodium as $\text{Na}^+ = 20 \text{ mg/L}$
Carbonate and bicarbonate as $\text{CaCO}_3 = 134 \text{ mg/L}$ 5
6. (a) Explain the different stability conditions in the atmosphere with respect to ideal lapse rate with the help of a diagram. 5
- (b) Compute the appropriate quantity of biogas to be generated in an anaerobic digester having a flow of $3600 \text{ m}^3/\text{h}$. assume biodegradable fraction as 0.85 and COD concentration in waste water as 5000 mg/L . 5
7. (a) Write the operating principle and give the labeled diagram of a condenser for control of gaseous pollutants. Also write the formula to calculate the heat exchange coefficient. 5

(b) Design an Electrostatic Precipitator to handle a quantity of $52 \text{ m}^3/\text{s}$ of air from a manufacturing industry. It contains the particles whose settling velocity is 0.13 m/s . If 99% removal efficiency is required, calculate the surface area of the ESP. 5

8. Write short notes on any **two** of the following : 5×2

- (a) Explain the different stages involved in MSW landfill.
- (b) Write the properties of hazardous wastes and explain the different treatment options for hazardous wastes.
- (c) Give a flow sheet for environmental clearance process for new industries in India and discuss on it.
- (d) What is flue gas desulphurization ? Discuss two popularly used compounds for reaction with SO_2 in the process.
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