Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

HSSM 3303

Sixth Semester Regular Examination – 2015

ENVIRONMENTAL ENGINEERING AND SAFETY

BRANCH (S) : AEIE, BIOTECH, CHEM, CIVIL, EC, EEE, ELECTRICAL, ETC, IEE, MINERAL

QUESTION CODE : J 404

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

(a) What are different types of food chain and write the significance of a food chain ?

(b) Write two Indian Environmental Acts which deals with the prevention and control of environmental pollution.

(c) Mention the drinking water quality standard (IS:10500) both permissible and desirable for turbidity and iron.

(d) What are the recommended methods for removal of floating materials and suspended solids from water ?

(e) Name four desirable properties of a good disinfectant.

(f) Calculate the waste water flow in m^3/ day for a serving population of 60,000. Assume the per capita water consumption is 135 L/day.

(g) Mention four basic characteristics of hazardous wastes.

(h) Differentiate between low rate and high rate digester.

(i) Differentiate between occupational disease and ergonomics.

(j) What is the need of integration of safety, health and environment ?

2. Explain the structural and functional units of a natural ecosystem with suitable examples. What are the ecosystems attributes ? 10

3. Give a clear flow sheet showing the unit operations for the conventional water treatment processes in India. Calculate the daily requirement of alum, lime and polyelectrolyte to coagulate a flow of 201 L/s. The optimum coagulation occurs when 1 liters of water is dosed with 3 ml. of 10 gm/L alum solution, 1.6 ml. of 5 gm/L suspension of lime solution and 0.3 mg/L of polyelectrolyte. 10

4. (a) What is the need of advanced water treatment process ? Explain ion-exchange and reverse osmosis as two important advanced water treatment processes. 5

(b) Compute the equivalent noise power level L_{Aeq} in a locality having three noise sources: 50 dB (A) acting for 20 minutes, 67 dB (A) acting for 30 minutes and 85 dB (A) acting for 10 minutes during one hour. 5

5. (a) Explain the different pre-treatment and primary treatment of waste water. 5

(b) Data from an unseeded domestic waste water BOD test are; 5 ml. of waste water in 300 ml. bottle, initial DO and 5 days DO of sample equals to 7.8 mg/L and 4.3 mg/L respectively. Compute the 5-days BOD and BOD_U, assuming K (base e) of 0.23/ day. 5

6. (a) Explain the absorption and adsorption methods for control of air pollutants. Write the most commonly used absorbent and adsorbent for the process. 5

(b) Construct a bag house using bags of 0.4 m in diameter and 6 m long. If the bag house receives a air flow of 21 m^3/s, compute the number of bags required in the bag house, assuming a filtration rate of 2 m/min. 5

7. (a) Many accidents occur due to improper use of tools and use of defective hand tools and equipments. What precautions are necessary in this regard ? 5

(b) What do you understand by hazards in industries ? Explain the safety handling and storage of hazardous materials and corrosive substances. 5

8. Answer any **two** of the following : 5×2

(a) What is photochemical smog ? Explain the mechanism of formation of PAN and its adverse effects.

(b) Types of reactors used for the treatment of water and waste water.

(c) Give a flow sheet showing the management of MSW and discuss on it.

(d) How human error leads to accidents in industry and what is hazard analysis ?