Bihar Engineering University, Patna
B.Tech. 5th Semester Examination, 2023

Course: B.Tech.
Code: 101502

Subject: **Environmental Engineering -I**

Time: 03 Hours
Full Marks: 70

Instructions:-
(i) The marks are indicated in the right-hand margin.
(ii) There are **NINE** questions in this paper.
(iii) Attempt **FIVE** questions in all.
(iv) Question No. **1** is compulsory.
(v) Assume data suitably, if not given

Q.1 *Choose the correct option of the following (any seven only) :*   [2 x 7 = 14]

(a) _____ is an operation designed to force agitation in the fluid and induce coagulation.
(i) Sedimentation   (ii) Flocculation
(iii) Disinfection   (iv) Aeration

(b) The area of the filter is 1500. What is the number of beds to be provided?
(i) 1   (ii) 2
(iii) 3   (iv) 6

(c) Which of the following is the correct expression of the aeration period in hours?
(i) V/Q (ii) $24V/Q$
(iii) $V/24Q$ (iv) Q/V

(d) The filter material used in contact bed is _____
(i) Sand   (ii) Stone ballast
(iii) Gravel   (iv) Fine sand

(e) The chemical composition of Alum is _____
(i) $Al_2(SO4)_3.18H_2O$ (ii) $Al_2(SO_4)_2.18H_2O$
(iii) $Al_3(SO_4)_2.18H_2O$ (iv) $Al_4(SO_4)_3.18H_2O$

(f) The depth of an enclosed tank of a slow sand filter lies in the range of _____
(i) 1-2m   (ii) 2.5-4m
(iii) 2-5m   (iv) 3-5m

(g) Which of the following is known as Shut off valve?
(i) Air relief valve   (ii) Sluice valve
(iii) Pressure relief valve (iv) Altitude valve

(h) The maximum permissible limit for suspended solids is _____
(i) 10 mg/l   (ii) 20 mg/l
(iii) 30 mg/l   (iv) 40 mg/l

(i) The chemical compound which is insoluble in water, formed when alum is added to water is _____
(i) $Al(OH)_3$ (ii) $CaSO_4$
(iii) CO_2 (iv) $Ca(OH)_3$

(j) The most hazardous gaseous air pollutant for human health is
(i) nitrogen   (ii) carbon dioxide
(iii) oxygen   (iv) sulphur dioxide

Q.2 (a) A water treatment plant is to treat water at the rate of 6000m³/day. If there are two rectangular sedimentation tanks (27m x 5m x 3.8m). Determine detection time and overflow rate.   [7]

(b) Explain point and line sources of noise pollution. Also write noise standards and sound pressure level.   [7]

Q.3 (a) Describe the principle of operation, advantages and limitations of the Gravitational settling chambers.   [7]

(b) Define troposphere, stratosphere with respect to the ranges of altitude also mention the range of temperature and important gases found in each of these layers.   [7]

Q.4 (a) What do you understand by design period of a water-supply scheme? Describe in brief the factors considered in estimating design period of a water supply scheme. **[7]**

(b) For water supply of a small town with daily requirement of 225000 litres, it is proposed to build a distribution reservoir. The pattern of draw of water is as follows: **[7]**

7:00 AM - 8:00 AM : 30% of daily supply
8:00 AM - 5:00 PM : 35% of daily supply
5:00 PM - 6:30 PM : 30% of daily supply
6:30 PM - 7:00 AM : 5% of daily supply

The pumping is to be done for 8 hours per day between 8:00 AM to 4:00 PM. Determine the storage capacity of reservoir.

Q.5 (a) Define air pollution. Explain primary and secondary air pollution. **[7]**

(b) What is photochemical smog, how is it formed and how does it effect. **[7]**

Q.6 (a) Write a note on air pollution caused by automobiles and its control. **[7]**

(b) What is meant by the effective height of a chimney and how is it computed? **[7]**

Q.7 (a) The population of 5 decade from 1930 to 1970 are given below in table . Find out the population after 2, 3, and 5 decades beyond the last known decade, by using Geometric increase method and decreasing rate method. **[7]**

Year	1930	1940	1950	1960	1970
Population	26,000	28,000	35,000	42,000	47,000

(b) How can you remove permanent hardness by Lime Soda Process? **[7]**

Q.8 Write short notes:- **[2 x 7 = 14]**
(a) Non-Return valves
(b) Coagulation and flocculation
(c) Disinfection
(d) Ozone layer
(e) Acid Rain
(f) Green House Effect
(g) Global warming

Q.9 (a) Briefly discuss the design principles involved in the design of a water supply network to be laid in multi-storeyed residential building. **[7]**

(b) What factors will you keep in mind while designing plumbing system for water supply to a house? **[7]**