Code : 011618

B.Tech 6th Semester Examination, 2017

Environmental Engg.-I

Time : 3 hours   Full Marks : 70

Instructions :

(i)   There are **Nine** Questions in this Paper.

(ii)   Attempt **Five** questions in all.

(iii) **Question No. 1 is Compulsory.**

(iv)   The marks are indicated in the right-hand margin.

1. Choose correct option from the following. Only one option should be chosen. (answer any seven).   2×7=14

(i) Air binding in rapid sand filters is encountered when

   (a) there is negative head

   (b) water is subject to prolonged aeration

   (c) the raw water contains dissolved gases

   (d) filter bed comprises largely of coarse sand

(ii) The characteristics of coliform organism are (I) Bacillus; (II) Gram negative; (III) Ferments lactose; (IV) spore forming:

   (a) I alone

   (b) I, II and IV

   (c) I, II and III

   (d) II, III and IV

(iii) Which of the filters provide the water with highest bacteriological characteristic?

   (a) Slow sand filter

   (b) Rapid sand filter

   (c) Pressure filter

   (d) Dual media filter

(iv) The raw water entering an ideal rectangular settling basin with following particles.

Particle Type	Settling Velocity (m/h)	Concentration (mg/L)
I	3	100
II	1	50

The settling basin has surface overflow rate of 3 m³/ m² / h then the concentration of particles in settled water will be:

   (a) 150 mg/1

   (b) 100 mg/1

   (c) 50 mg/1

   (d) 0 mg/1

(v) The argentometric titration for determination of chlorides in water with potassium chromate yield .... color at end point.

Code : 011618   2

(ix) Which of the following is an example of a temporary threshould shift?

    (a) Tinnitus

    (b) A firecracker that explodes next to the ear causing permanent damage

    (c) The ringing in your ears that occurs for a few hours after going to a concert

    (d) The sound of a bus driving by as you are walking on the sidewalk

(x) Noise level of general conversational speech is:

    (a) 30 dB

    (b) 60 dB

    (c) 90 dB

    (d) 100 dB

2. (a) Describe the MPN test for the determination of bacteriological quality of water.   6

    (b) Describe any four water borne diseases due to pathogens with symptoms and organism responsible for those diseases.   8

3. (a) Draw a neat flow diagram for treatment of drinking water sourced from ground water with justification of each treatment unit employed for the treatment.   6

(b) A 60 cm diameter well "X" in and unconfined aquifer is being pumped at the rate of 1360 litres/min. Measurements at nearby test wells were made during the test. At a distance of 6 m and 15 m from well "X" drawdown was 6 m and 1.5 m respectively. The bottom of well is 90 m below the ground water table. (i) Find the hydraulic conductivity of aquifer; (ii) Find the drawdown in the well; (iii) What is the specific capacity of the well? ; (iv) Find the maximum rate at which water can be drawn from the well.   8

4. (a) Describe the difference between slow and rapid sand filter with their advantages and disadvantage for treatment of drinking water.   6

(b) Find the terminal setting velocity of a spherical suspended particle of diameter 0.5 mm and specific gravity 2.65 at 20°C. The viscosity of water is 1.002×10^{-3} Ns/m² at 20°C. Also Coefficient of drag (C_d) for transitional & turbulent flow for various Reynolds number (R_e) can be assumed as follows: 8

$$C_d = \frac{24}{R_e} + \frac{3}{(R_e)^{1/2}} + 0.34 \text{ (transitional)}$$

$$C_d = 0.4 \text{ (turbulent)}$$

5. (a) Explain the term Breakpoint Chlorination and its chemistry in context of disinfection of water supply. 6

(b) Results of a chlorine demand test on raw water is a as follows:

Sample No.	Chlorine Dosage (mg/1)	Residual Chlorine after 10 min contact (mg/1)
1	0.2	0.19
2	0.4	0.36
3	0.6	0.50
4	0.8	0.48
5	1.0	0.20
6	1.2	0.40
7	1.4	0.60
8	1.6	0.80

What is the breakpoint dosage ? What is chlorine demand at dosage of 1.2 mg/l? 8

6. (a) Describe any two processes for removal or permanent hardness from water 6

(b) Calculate the total Hardness of water as $CaCO_3$ for following ionic constituents (meq/L) in it.

$Ca^{2+} = 4.7$ $HCO_3^- = 2.5$

$Mg^{2+} = 1.0$ $SO_4^{2-} = 2.9$

$Na^+ = 2.2$ $Cl^- = 2.5$

$CO_2 = 0.6$ 8

7. (a) What are the different impacts of noise pollution on hearing? 7

(b) Discuss the Indian regulatory guidelines for noise pollution for different zones. 7

8. Determine the distribution of flow in the pipe network shown. The head loss h_L may be assumed as kQ^n. The flow is turbulent and the pipes are rough. The value of k for each pipe is indicated in the figure. Use Hardy Cross method. 14
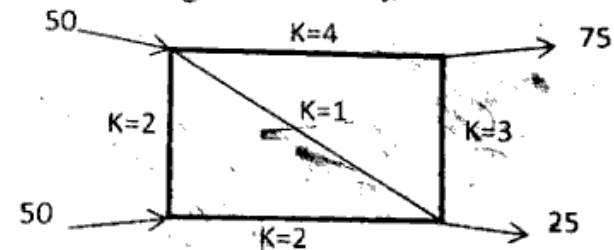
8. Write Short notes on any four. 4×3.5=14

(a) Heavy metals in drinking water;

(b) Fluctuations in water demand

(c) Period of design;

(d) Patterns of Distribution system;

(e) Stable and Unstable suspensions;

(f) Different types of pump used in water supply;

(g) Noise pollution prevention;

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