(Please write your Exam Roll No.) Exam Roll No. 40818003416

END TERM EXAMINATION

FOURTH SEMESTER [B.TECH] MAY-JUNE 2018

Paper Code: ETCE-202 **Subject: Water Engineering (Batch 2013 Onwards)**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt five questions in all including Q no.1 which is compulsory. Select one question from each unit. Assume suitable missing data if any.

Q1 (a) Complete the following statements by inserting appropriate words/figures/sentences- **(10x1.5=15)**

(i) The per capita water demand of an unsewered city with population 0.30 lakh is _____ and for a modern Indian City with population 40 lakh the recommended per capita water demand will be _____ because —.

(ii) Fire demand of a City is dependent on the following _____

(iii) The following are waterborne viral diseases ____. In order to ensure the absence of virus in water supply we must check the following ___

(iv) The adsorption capacity of an Adsorbent is found by ___ and calculated using _____ equations.

(v) The population of a town in 3 consecutive decades are 40 lakh, 80 lakh, 125 lakh respectively. The saturation population will be _ and population of the town in 4^{th} and 5^{th} consecutive decades will be ___ and ____ by geometric increase.

(vi) Presence of Nitrate in drinking water above ___ causes ___, whereas ___ could be caused due to the presence of sulphate in Concentration above___.

(vii) The difference between Type I, Type II and Type III sedimentation is the following ___

(viii) Coagulant like $FeSO_4$ and $FeCL_3$ work well in following situation___. Activated silica and polyelectrolyte serve following purposes ___. The mechanism of polyelectrolyte action is ___.

(ix) MPN is a measure of density/concentration of ___.

(x) The factor affecting disinfection efficiency of chlorine are the following___.

(b) Comment critically (answer **any five**)- **(5x2=10)**

(i) pH is a very important parameter for coagulation and disinfection of water.

(ii) The mechanism of filtration remains same in slow sand and rapid gravity filter despite widely different sand media size.

(iii) Coagulation and flocculation are same.

(iv) It can be a good idea to use a rectangular shaped long tank (L/B=5) for plain sedimentation of raw water.

(v) Disposal of Heavy metals and pesticides even in small concentrations can have adverse effects on the water bodies.

(vi) Intermittent system of water supply results in reduced water consumption and better public health.

UNIT-I

Q2 (a) Write short note on **(6)**

(i) Well development

(ii) Infiltration well, Infiltration gallery and Ranney wells.

(b) An artesian well is being pumped @96 m^3/hr. Measurement made as follows: **(6.5)**

(i) Draw down in a test well 150m away = 0.75 m

(ii) Draw down in a test well 300 m away = 0.6 m

(iii) Thickness of Aquifer = 6 m

Determine the Transmissibilitiy of the well.

OR

Q3 (a) What are the standards for discharge of treated wastewater in natural water bodies? **(3)**

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(b) Explain the difference between different types of Surface water intakes and their specific suitability. **(3.5)**

(c) Mention the common impurities in water, which should be taken into account while deciding the potability of water. State the harmful effects if these impurities exceed the prescribed limits. **(6)**

UNIT-II

Q4 (a) Name and briefly describe the major physical and chemical processes involved in helping or obstructing the natural purification process in water courses. **(4)**

(b) A city discharges 1500 lps of waste water into a stream with minimum discharge 6000 lps. BOD_5 of waste water is 200 mg/l.&BOD_5 of stream water = 1.0 mg/l. DO of waste water=00. Assume the stream to be 90% saturated with oxygen. Take K_1=0.10 d^{-1}, K_2=0.3 and DO saturation of stream water=9.2 mg/l. If, minimum DO to be maintained in all the stretches of stream is 4.5 mg/l., Find the required degree of treatment of BOD_5. **(8.5)**

OR

Q5 (a) Discuss thermal stratification and its importance in temperature of stream and lakes. **(5)**

(b) What do you understand by Oxygen-Sag Curve? Derive Streeter-Phelps Equation. **(7.5)**

UNIT-III

Q6 (a) Find the aeration time required to treat water with iron conc.=2.4 mg/l to level 0.3 mg/l. **(7.5)**

Given: saturation Conc. of O_2 at 28°C=7.92 mg/l.
Gas transfer coeff (base 10)=70 cm/hr.
Diameter of spray aerator nozzle=25 mm.

(b) What is an ideal sedimentation tank? Derive an expression for overflow rate for discrete particle settling in a rectangular tank. **(5)**

OR

Q7 (a) Explain the mechanism of coagulation. List various coagulants giving special emphasis on the chemistry of water treatment using alum. **(7.5)**

(b) Write short notes on:- **(5)**
(i) Water softening methods
(ii) Rapid mixing and Flocculator design

UNIT-IV

Q8 Write notes on:- **(4+4.5+4=12.5)**
(a) Balancing storage
(b) Hydraulic analysis of pipe network
(c) Layout of distribution system

OR

Q9 Write short notes:- **(3+3+3.5+3=12.5)**
(a) Appurtenances in Water supply
(b) Components of distribution system
(c) Calculating the capacity of distribution reservoir from Hourly Supply, demand data.
(d) Optimal design of rising main

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