[5353] - 110
T.E. (Civil) End Semester
ENVIRONMENTAL ENGINEERING - I
(2012 Pattern)

Time :2½ hours]   *[Max. Marks :70*

Instructions to the candidates:

    1)   *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, and Q.9or Q.10*

    2)   *Figures to the right indicates full marks*

    3)   *Draw neat figures wherever necessary*

    4)   *Assume necessary data*

    5)   *Use of scientific calculators is allowed*

Q1) a)   Write working principle of cyclone and draw a schematic sketch of multi cyclone and write its application to control particulate matter. **[1+2+2]**

     b)   Enlist sources of noise pollution and define sound pressure, sound intensity. **[3+2]**

<div align="center">OR</div>

Q2) a)   Write and explain factors affecting rate of demand. **[5]**

     b)   Write working principle of settling chamber and draw its schematic diagram and write its advantages to control particulate matter. **[1+2+2]**

Q3) a)   Water has to be supplied to a town with one 200000 population at the rate of 150 1/c/d from a river, 2 km away. The difference in elevation between the lowest water level in the sump and service reservoir is 30 m. Determine the size of the main and head loss. Maximum demand is 1.8 times of average demand. Pumps are working for 12 hours per day to supply water, flow through velocity is 1.5 m/s $C_H = 120$. **[5]**

     b)   Define design period and write data to be collected for water supply scheme. **[5]**

<div align="center">OR</div>

<div align="right">*P.T.O.*</div>

Q4) a) A circular sedimentation tank fitted with standard mechanical sludge removal equipment is to handle 3 MLD of raw water. If the detention period of the tank is 4 hours and the depth of the tank is 3 m. What should be the diameter of the tank? **[5]**

b) Draw the schematic sketch of river intake and canal intake. **[5]**

Q5) a) What are the factors on which dose of coagulants depends? Explain how the optimum coagulant dose is determined? **[6]**

b) Design a circular flocculator for a design discharge of 3 MLD with mechanical paddle and detention period of 30 minutes. Depth of basin is 3 m, area of paddles is 20 % of vertical cross section. **[6]**

c) Write working principle of pressure filter, draw its schematic sketch and write its advantages. **[6]**

OR

Q6) a) A filter unit is 4 m by 9m. After filtering $10000 m^3/d$ in 24 hour period, the filter water is backwashed at a rate of 10 lit/m^2/ sec for 30 minutes. Calculate the average filtration rate, quantity and percentage of treated water used in washing and the rate of wash water flow in each trough. Assume 4 troughs. **[8]**

b) Explain the theory of coagulation. Give the chemical equation of coagulation by alum. **[6]**

c) Differentiate between slow sand filter and rapid sand filter. **[4]**

Q7) a) Define break point chlorination and explain how it is determined. **[6]**

b) Explain hardness removal by zeolite process. **[5]**

c) Explain removal of colour and odour by adsorption phenomena. **[5]**

OR

Q8) a) The water works of a town of population 200000 has to meet its water demand at the rate of 150 lit/c/d. If the disinfection is to be done by bleaching powder having 45% available chlorine, determine the quantity of bleaching powder required per year. The required dose of chlorine at the water work is 0.3 ppm for disinfection. **[6]**

b) Write principle, advantages and disadvantages of electro dialysis for demineralization of water. **[6]**

c) Write factors affecting disinfection. **[4]**

Q9) a) Deigned demand of town is 3 MLD. It is pumped into an elevated service reservoir at a uniform rate from 5am to 9 am & 5pm to 9pm. The variation in consumption of water is given below. **[8]**

Period	5am to 9am	9 am to 5pm	5pmto 9pm	9pm to 12am	12am to 5am
Consumption	40%	15%	30%	10%	05%

Determine the balancing capacity of the reservoir.

b) Draw a flowchart of package water treatment plant and write its advantages. **[4]**

c) Write difference between continuous and intermittent system. **[4]**

OR

*Q10)*a) Calculate the storage capacity and dimensions of the tank to store rain water for the given data: **[6]**

Terrace area 200 m², average annual rainfall = 720 mm and runoff coefficient = 0.8.

Consider Length = 2 x width and depth = 2 m.

b) Write methods to detect the wastage of water and its prevention. **[6]**

c) Draw a schematic sketch of rooftop rain water harvesting system and write its components. **[4]**

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