Total No. of Questions : 4]

SEAT No. :

PD80

[Total No. of Pages : 2

[6410]-401
T.E. (Civil) (Insem)
WASTE WATER ENGINEERING
(2019 Pattern) (Semester-II) (301012)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Attempt Q.1 or Q.2 Q.3 or Q.4.***
2) ***Figures to the right indicate full marks.***
3) ***Use of calculator is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) Write the necessity of pumping of the sewage. **[4]**

b) Define DO deficit. Explain the Oxygen Sag curve. **[5]**

c) Relate the significance of 'Self Cleansing Velocity' and 'Limiting Velocity' of sewage flow in the sewers. Calculate the minimum velocity and gradient required to transport coarse sand of 1 mm diameter through a sewer of 0.60 m diameter. Assume sewer running half full. Take specific gravity = 2.66, $\beta = 0.06$, $f = 0.02$ and $N = 0.012$. **[2+4]**

OR

Q2) a) Explain in brief self-purification of natural streams. **[5]**

b) Write Streeter-Phelps equation and explain the meaning of each term. **[2+3]**

c) The following data is available regarding various types of area and the corresponding impermeability factors of a town: **[5]**

Sr.No.	Type of catchment	% of area	Impermeability coefficient
1	Roofs	15%	0.9
2	Pavements	20%	0.8
3	Lawns & gardens	40%	0.15
4	Unpaved	15%	0.20
5	Wooded	10%	0.05

Determine the average coefficient of runoff.

If the total area of the district is 20 hectares, determine the maximum storm water flow for a rainfall intensity of 50 mm/hour having a frequency of once in five years. Use rational formula.

P.T.O.

spppquestionpapers.com
CEGP013091
49.248.216.237 10/03/2025 10:31:55 static-237

Q3) a) Draw a flowchart for sewage treatment plant consisting primary and secondary treatment. Enlist the pollutants removed from each unit operation and process. **[2+3]**

b) Design a rectangular grit chamber from following data. **[5]**

Maximum Flow of sewage = 20 MLD

Specific gravity of grit = 2.65

Diameter of grit particle to be removed = 0.2 mm and above

Average temperature = 20ºC

Flow through velocity = 0.23 m/sec

Width of grit chamber = 1.2 m

Freeboard = 0.3 m

Space of the sludge accumulation = 0.25 m

c) Design a circular settling tank unit for a primary treatment of sewage at 12 million liters per day. **[5]**

Assume,

i) Detention time = 2 hr

ii) Surface Loading Rate = 45000 l/m^2/d

OR

Q4) a) Write the significance of velocity control devices in horizontal flow rectangular grit chambers. Explain any one Velocity control device. **[2+3]**

b) Design a grit chamber for the following data: **[5]**

i) Flow = 1650 m^3/hr

ii) Settling Velocity of particle = 0.01 m/s

iii) Flow through velocity = 0.30 m/s

c) Design a primary settling tank of rectangular shape for a town having population of 150000 with a water supply of 180 liters per capita per day. Take overflow rate = 30 m^3/d/m^2. Assume suitable data if required. **[5]**

spuquestionpapers.com
CEGP013091
49.248.216.237 10/03/2025 10:31:55 static-237