Total No. of Questions : 4]

SEAT No. :

PF282

[Total No. of Pages : 2

Apr-26/TE/Insem-361

T.E. (Civil Engineering) (Insem)

WASTE WATER ENGINEERING

(2019 Pattern) (Semester - VI) (301012)

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

Instructions to the candidates:

1) ***Attempt Q1 or Q2 and Q3 or Q4.***
2) ***Neat diagrams must be drawn whenever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary and clearly state.***
5) ***Use of electronic pocket calculator is allowed.***

Q1) a) Write factors considered while estimating sewage flow. Determine the domestic sewage flow generated from a town using following data, Population: 80000 and rate of water supply: 150 lpcd of which 80% contributes to sewage generation. Consider Peak factor 2. **[2+3]**

b) Differentiate between separate sewerage system and combined sewerage system? **[5]**

c) Design a circular sewer for the conveyance 5 MLD of sewage flow. The sewer should be designed to carry maximum discharge while running half full. A velocity of 1.0-1.5 m/s should be generated at maximum flow. Use the following data. **[5]**

i) Max. flow/Ave. flow = 3

ii) Manning's constant = 0.0 13

OR

Q2) a) Enumerate the causes to consider the emerging contaminants of waste water while designing a sewage treatment plant. Write any 3 emerging contaminants in waste water. **[5]**

b) Explain the various zones of pollution for a polluted river undergoing self-purification. **[4]**

c) The 5 day BOD of a wastewater sample at 20ºC was found to be 300 mg/l. Determine the ultimate BOD and 3day BOD at 30ºC. Take KD = 0.1/d at 20ºC. **[6]**

P.T.O.

Q3) a) Draw a flowchart for sewage treatment plant consisting primary and secondary treatment. Enlist the pollutants removed from each unit operation and process. **[5]**

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

i) Flow = 1500m^3/hour

ii) Setting velocity of particle 0.01 m/s

iii) Flow through velocity 0.3 m/s

iv) Depth of grit chamber 0.5 m

c) Design primary settling tank of rectangular shape for a town having a population of 130000 with sewage generation rate of 150 lpcd. Surface overflow rate 50m^3/d/m^2. Consider detention period = 2hrs. Assume length to width ratio as 2 : 1. **[5]**

OR

Q4) a) Write the significance of provision of equalization, neutralization and skimming tanks in effluent treatment plant. **[3]**

b) Find number of openings and number of bars of a screen to handle 25 MLD of waste with approach velocity 1m/s. Assume depth of flow = 0.9m, size of each opening = 25 mm, diameter of bar = 10mm. Also find head loss to screen if screen is kept at an angle of 600 with horizontal. **[6]**

c) Determine diameter and depth of primary sedimentation tank for sewage flow 30 million litres per day. **[6]**

Given data :

i) Detention time = 2.5 hours

ii) Surface loading rate = 40000 l/m^2/d

iii) Freeboard 0.5m and sludge accumulation space 0.5m.