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FIFTH SEMESTER **B.Tech. (Civil)**

SUPPLEMENTARY EXAMINATION **February-2019**

CCE-309 Environmental Engineering & Design

Time: 3:00 Hours ***Max. Marks: 40***

Note : **Answer any four questions**
Assume suitable missing data, if any.

Q.1(a) . Find the dimensions of a rectangular sedimentation tank for the following data.

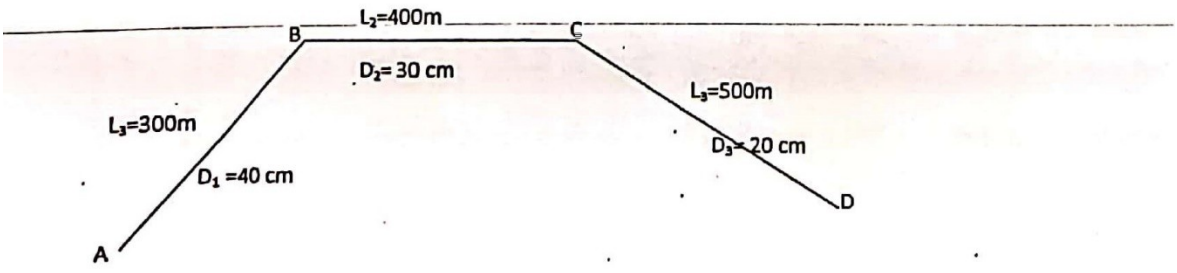
Volume of water to be treated is 3 MLD
Detention period is 4 hours
Velocity of flow is 10 cm/min. (4 Marks)

(b) Design a rapid sand filtration units for a town having a total filtered water requirement of 5 million litres of water per day. Assume the following

Rate of filtration	2.5×10^5 m^3/ha/day
Amount of wash water	3 % of filtered water per day
Filter dimensions of each unit	18 m x 10 m

The filter needs backwashing once in 24 hours. Assume any other data not given. (6 marks)

2 Find the equivalent length of 30 cm diameter pipe for the network shown in figure, using (a) Darcy's formula (b) Hazen Williams formula
(10 Marks)



3. (a) Design an oxidation pond for treating domestic sewage of 10,000 persons supplied with 200 litres per capita water per day. The BOD and the suspended solids are each of 300 mg/litre. Permissible organic loading for the pond is not less than 500 kg/ha/day. The detention period is not to exceed 6 days. Assume width of the pond to its length as 1:2 and the operational depth as 1.2 m. Assume any other suitable data. (6 marks)

(b)How do you determine the capacity of reservoir? Explain the method of determining the storage capacity of equalizing reservoir. (4 marks)

4.(a) Determine the size of a circular sewer for a discharge of 1.2 cumecs running half full. Assume grade of 1 in 2000 and N = 0.013. (4 marks)

(b) Compute the diameter of a circular trickling filter for 500 users. Dry weather flow is 150 litres/capita/day. Rate of filtration of trickling filter may be taken as 12 million litres/ ha/meter. (6 marks)

5 (a) Design an activated sludge plant with diffuser plates, given the following particulars

Average inflow = 400 m^3/hr.

Amount of return sludge = 30%

Aeration time = 5 hours. (5 marks)

(b) Design a single stage trickling filter to yield an effluent BOD of 30 mg/l. The influent BOD following primary clarification is 160 mg/l and the flow is 10^4 m^3/day. Maintain a hydraulic loading rate of 20 m/day and a filter depth of 2 m. (5 marks)

6(a) What is meant by sludge recycle? How do you determine the sludge recycle rate if SVI and MLSS concentration in the reactor are known. (4 marks)

(b) Design a gravity thickener for thickening the combined primary and activated sludge from a treatment plant for 1,20,000 population. (6 marks)