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Paper Code: ENV-31G	Roll No.										

M. Tech.
THIRD SEMESTER EXAMINATION, 2016-17
DESIGN OF WATER SUPPLY SYSTEMS

[Time: 3 hrs.] [Max. Marks: 100]

Note: Attempt ***ALL*** questions. Assume suitable data, if required. All question carry equal marks.

1. Attempt any two parts of the following:- **(10x2=20)**

(a) Describe impounding reservoir and discuss their management.

(b) Explain in detail common problems encountered in rapid gravity filters? Discuss the methods for its remediation.

(c) In a pumping station, 18,000m³ water is to be raised per day from an intake well to a sedimentation tank under the static head of 21 m. Lengths of suction pipe and rising main 40m and 150m respectively. Diameter of pipes is 50cm. There are two shifts of working of pumps each of 8hrs. Take coefficient of friction as 0.01 and combined efficiency of motor and pump as 80%. Recommend the number of units of pumps each having BHP of 30.

2. Attempt any one part of the following: - **(20x1=20)**

(a) Design a rectangular sedimentation tank with a *good* performance for following data:

(i) Required outflow from sedimentation tank = 300m³/hr
(ii) Water used in de-sludging = 2%
(iii) Minimum size of particles to be removed = 0.018mm
(iv) Expected removal efficiency of minimum size particle = 75%
(v) Nature of particles : discrete and non-flocculating
(vi) Specific gravity of particles 2.65
(vii) Kinematic viscosity of water at 20°C $= 1.01 \times 10^{-6} \mathrm{m}^2/\mathrm{s}$

(b) Design the following for rapid sand filter for a town having a total filtered water requirement of 5MLD (Assume suitable data):
(i) Dimensions of filter units
(ii) Under-drain system
(iii) Wash water discharge and velocity
(iv) Design of wash water trough

3. Attempt any two parts of the following: - **(10x2=20)**

(a) Discuss the two types of aeration depending upon the mechanism of aerators. Describe the different aerators that come under these two types.

(b) What is topographic survey? Discuss the significance of topographic survey in planning of water treatment project.

(c) A service reservoir receives water from an impounding reservoir, distance 40 km. The difference in levels between the water levels of these reservoirs is 120m. The two reservoirs were originally connected by a single pipe line design to carry a maximum daily requirement of 18 million liters per day. It is now desired to increase the supply to 25 million liters per day by laying another pipe line of the same diameter alongside the first one, in a certain required length and cross-connecting the two. Using Hazen-William's equation (C=120), determine (i) The Diameter of the pipes (ii) Length of the second pipe required to be laid.

4. Attempt any two parts of the following:- **(10x2=20)**

(a) A pipe network in the form of a triangle ABC has inflow of 5 m^3/s and 4 m^3/s at A and B respectively. The out flow at C is 9 m^3/s. given K_{ab}= 10, K_{bc}= 50 and K_{ac}= 20, compute discharge in each pipeline [H_f=KQ^2]

(b) Discuss the types of intakes structure. What are the factors which govern the location of an intake structure on a meandering river?

(c) Write detailed account of identification report and feasibility report for new water supply project?

5. Attempt any four of the following: - **(5x4=20)**

(a) What are air release valve?

(b) Describe simple submerged intake structure.

(c) Explain up flow filters and bi flow filters.

(d) What are chlorinators?

(e) Discuss the factors effecting water demand in a city.

(f) What are the causes of water hammer in a water supply system?