Total No. of printed pages = 4

CT-506/EE/5th Sem/2014/N

ENVIRONMENTAL ENGINEERING

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

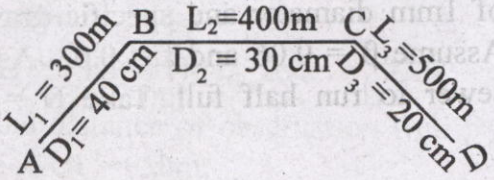
Answer any *five* questions.

1. (a) Why treatment of water is necessary ? Give an outline of various processes adopted for treatment of water. 7

   (b) Find the equivalent length of 30 cm diameter pipe for the network shown in figure given below using

   (i) Hazen William formula

   (ii) Darcy's formula. 7



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2. (a) Write notes on the various forms of chlorination. 10

(b) An impervious area of 20 hectares is to be served by a sewer line. The area is subjected to two storms P_1 and P_2 with equal frequency of occurence, the duration of two storms are 20 minutes and 30 minutes. Taking the time of concentration of 30 minutes, determine the maximum runoff from each storm. 4

3. (a) Explain the working of a rapid sand gravity filter. 10

(b) What do you understand by coagulation and flocculation ? 4

4. (a) Derive Stoke's law for settlement of discrete particle in water. 7

(b) Find the minimum velocity and gradient required to transport coarse sand through a sewer of 60 cm diameter with sand particle of 1mm diameter and specific gravity 2.66. Assume $\beta = 0.06$ and $f = 0.02$. Assume the sewer to run half full. Take $N = 0.012$. 7

5. (a) Find the dimension of a rectangular sedimentation basin for the following data :

(i) Volume of water to be treated = 3 million litre per day

(ii) Detention period = 4 hours

(iii) Velocity of flow = 10 cm/min. 6

(b) Classify various types of filters. Differentiate between slow sand filter and rapid sand filter. 8

6. (a) The following observations were recorded during a pumping out test on a tube well penetrating fully in a free aquifer : 8

Well diameter = 25 cm

Discharge from the well = $300 m^3/hr$

R. L of original water surface, before pumping started = 122.0m

R. L of water in the well at constant pumping = 117.1m

R. L of water in the observation well = 121.3m

R. L of impervious layer = 92.0

Radial distance of observation well from the tube well = 50m.

Determine

(i) The field permeability coefficient of the free aquifer.

(ii) Radius of zero draw down.

(b) Describe various types of coagulant commonly used in water treatment. 6

7. (a) Describe in brief water carriage system stating advantages and disadvantages of each. 6

(b) Derive an expression for discharge from a well fully penetrating a confined aquifer. 8