GANPAT UNIVERSITY

B. Tech. Semester: Vth (CIVIL) Engineering

Regular Examination November – December 2014

2CI505 - ENVIRONMENTAL ENGINEERING-I

Time: 3 Hours / As per Scheme　　　　　　　　　　　　　　　**Total Marks: 70**

Instruction:　1 Answer to the two sections must be written in **separate** answer books.
　　　　　　　　2 Figures to the right indicate **full** marks.
　　　　　　　　3 Assume suitable data if required.

Section - I

Que. – 1　**A**　What do you understand by "per capita demand"? Explain briefly various　5
　　　　　　　　types of water demand.

　　　　　　B　The following data shows the variation in population of a town from 1940 to　7
　　　　　　　　1980. Find out the population of in decades 1990, 2000, 2010, by using
　　　　　　　　decrease growth rate method.

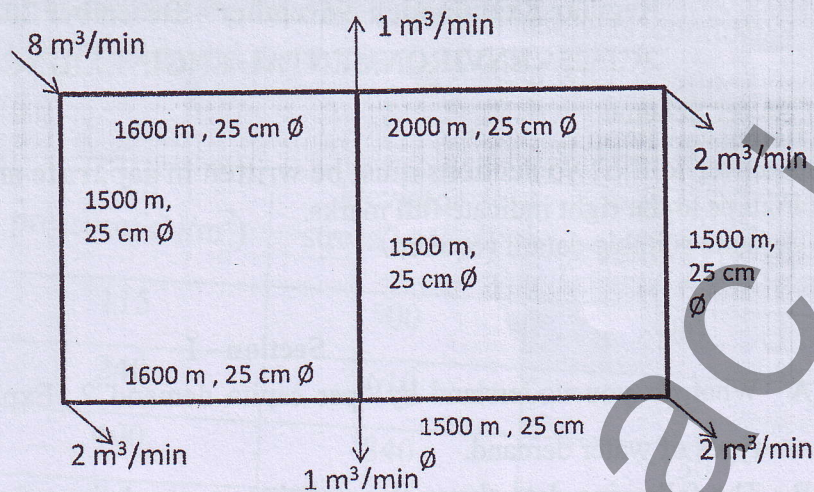| Year	1940	1950	1960	1970	1980
Population	25000	28000	32500	40000	45000

OR

Que. – 1　**A**　The population of city in successive decennial census is given as 40000 and　7
　　　　　　　　50000. Assuming the census date as 12th May, find the midyear population as
　　　　　　　　12th November for　(a) 3rd inter Censal year, and (b) 6th post-Censal by the
　　　　　　　　arithmetical increase method and Geometrical Increase method.

　　　　　　B　Define the following terms.　5
　　　　　　　　(a) Macwane Pipe (b) Delavaud pipe (C) Pit Cast Pipe (D) Sand Spun Pipe
　　　　　　　　(E) Pipe

Que. – 2　**A**　Define Pump and also explain the working of Reciprocating pump.　5

　　　　　　B　Water has to be supplied to a town having one lakh population at the rate of　6
　　　　　　　　150 LPCD from a river 200 m away. The difference in elevation between the
　　　　　　　　lowest water level in the sump and reservoir is 36m. If the demand has to be
　　　　　　　　supplied in 8 hours, determine the size of main and the Break Horse Power of
　　　　　　　　the pump required. Assume maximum demand as 1.5 times the average
　　　　　　　　Demand. Assume f=0.0075, velocity in pipe 2.4 m/sec and efficiency of pump
　　　　　　　　80 percentage.

OR

Que. – 2　**A**　Draw and explain different types of joints used in Cast iron pipe.　5
　　　　　　B　Write a short note on following　6
　　　　　　　　(a) Water Supply Project Estimation
　　　　　　　　(b) Water Supply Drawing

Que. – 3 Attempt the following

    A Analyze the Pipe Network as shown in fig. Take C=100 in the Hazen William's formula. Assume suitable Data if Requires. (up to two trials)

```
   8 m³/min              ↑ 1 m³/min

   ┌─────────────────────┬─────────────────────┐
   │  1600 m , 25 cm Ø    │  2000 m , 25 cm Ø    │→ 2 m³/min
   │                      │                      │
 1500 m,                  │                    1500 m,
 25 cm Ø             1500 m,                   25 cm
                     25 cm Ø                    Ø
   │                      │                      │
   │  1600 m , 25 cm Ø    │                      │
   └─────────────────────┴─────────────────────┘
   ↓                      ↓  1500 m , 25 cm      ↓
  2 m³/min            1 m³/min      Ø          2 m³/min
```

Section – II

Que. – 4 **A** Design a flocculator and clarifier for a design flow of 300 m³/h. Assume suitable permissible values for various parameters of design.   8

    B A rectangular sedimentation basin is to handle 10 MLD of raw water. A detention basin of width to length ratio of 1/3 is proposed to trap all particles larger than 0.04 mm in size. Assuming a relative density of 2.65 for the particles and 20°C as the average temperature, compute the basin dimensions. If the depth of the tank is 3.5m, calculate the detention time   4

OR

Que. – 4 **A** Design a river intake with respect to (i) number and size of openings in intake well; (ii) size, shape and height of intake well and (iii) gravity pipe of raw water connecting the intake well and jack well. The data supplied is:
R.L. of river bed = 150m
R.L. of lowest water level = 153m   7

    B Write a short note with neat figures on
       (1) Cascade aerators
       (2) Inclined apron aerators   5

Que. – 5 **A** Design the following components (i) Filter units (ii) Under drainage system (iii) Wash water discharge and velocity (iv) Wash water trough (v) Depth of sand (vi) Gravel size gradation (vii) Filter tank total depth for a Rapid Sand Gravity Filter Unit for a town having a total filtered water requirement of 5 MLD. Assume necessary data.   11

OR

Que. – 5 **A** Explain break point chlorination with neat figure.   4
    B Define MPN.   1
    C The concentration of OH^- ion in a water sample is measured as 17 mg/L at 25°C. What is the pH of water sample?   2
    D Describe the following unit operation:- Solute Stabilization   4

Que. – 6   A   A coagulation treatment plant with a flow of $0.5 m^3/s$ is dosing alum at   6
23mg/L. No other chemicals are being added. The raw water suspended solids
concentration is 37 mg/L. The effluent suspended solids concentration is
measured as 12 mg/L. The sludge content is 1% and specific gravity of sludge
solids is 3.01. What volume of sludge must be disposed of each day? (Given
the molecular weights as: Al=27, S=32, O=16, H=1, Ca=40, C=12)

B   Explain Zeolite process for removing permanent hardness.   4

C   Define: (i) Free Available Chlorine   2
              (ii) Combined chlorine

END OF PAPER
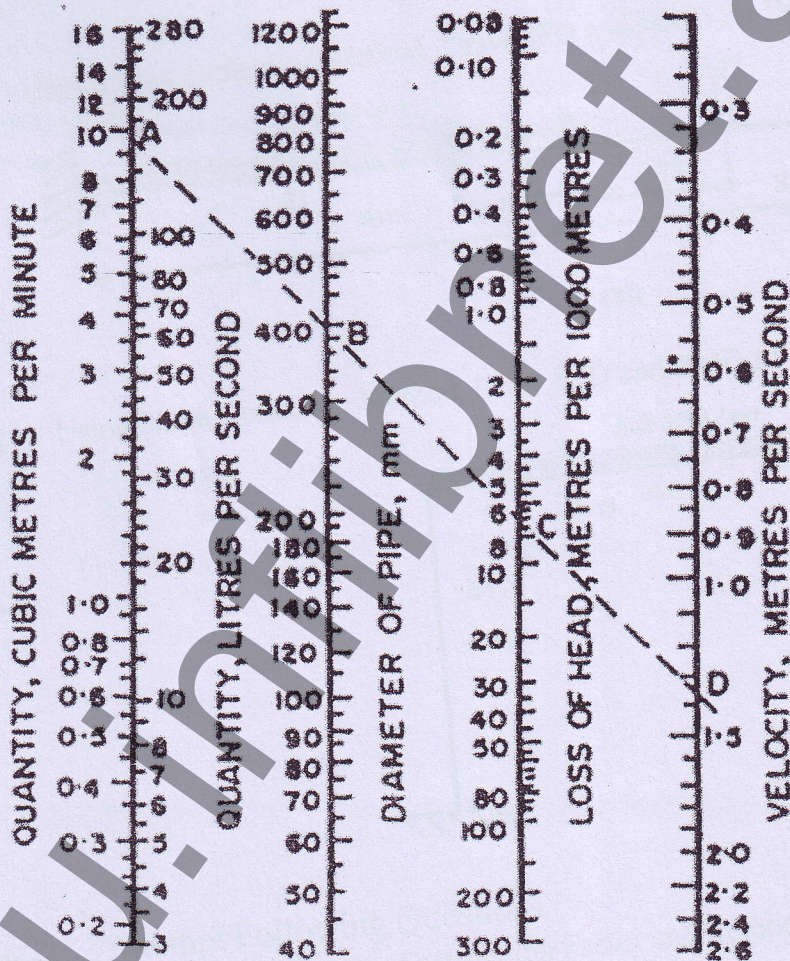
NOMOGRAM FOR HAZEN WILLIAMS FORMULA (C= 100)