Student Exam No._____

GANPAT UNIVERSITY

B. Tech. Semester: Vth Civil Engineering

Regular Examination Nov – Dec 2015

2CI-505 Environmental Engineering - I

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

Instruction: 1. Figure Right Side Indicate the Marks.
             2. Assume Suitable data if required.
             3. Draw the sketches if necessary.

SECTION - I

Que. – 1   A   Explain the significance of the following from the point of view of water quality   05
               criteria:
               1) Taste and Odour
               2) Chlorides
               3) Nitrates
               4) Iron and Manganese
               5) Colour

Que. – 1   B   Design a bell mouth canal intake for a city of 1,10,000 persons, drawing water   07
               from a canal which runs only for 10 hours a day with a depth of 1.5m. Also
               calculate the head loss in the intake conduit if the treatment works are 0.58 km
               away. Draw a neat sketch of the canal intake. Given average consumption per
               person = 150 L/d. Assume the velocity through the screens and bell mouth to be
               less than 16cm/sec and 32 cm/sec respectively.

OR

Que. – 1   A   Explain the importance of physical and chemical analysis of water used for   06
               domestic purposes.

Que. – 1   B   If a water sample having pH of 4.1, then what will be its hydroxyl ion   03
               concentration?

Que. – 1   C   For a water sample having a total hardness of 200mg/l as $CaCO_3$ and alkalinity   03
               of 250 mg/l as $CaCO_3$, find its carbonate hardness and non-carbonate hardness.

Que. – 2   A   Design a rapid sand gravity filter for a town having water requirement of 4.2   11
               MLD.

OR

Que. – 2   A   What do you mean by schmutzdecks? How is it formed?   03

Que. – 2   B   Design a circular sedimentation tank fitted with mechanical sludge remover for   05
               water work which has to supply daily 4.2 million liters of water to the town. The
               detention period in the tank for water is 4.5 hours and depth of water in the tank
               may be assumed as 3.3m. Draw neat figure of circular sedimentation tank.

Que. – 2   C   Find the settling velocity of a discrete particle in water under conditions when   03
               Reynolds's number is less than 0.5. The diameter and specific gravity of a
               particle is 4 x 10^{-3} cm and 2.65 respectively. Water temperature is 20°C
               (kinematic viscosity of water at 20°C is 1.01 x 10^{-2} cm^2/sec).

Que. – 3 A Write a short note on: (any four)   12

        1. Sedimentation with Coagulation.
        2. Backwashing method of Rapid Sand Gravity Filter.
        3. Ozonation.
        4. Break point chlorination.
        5. Removal methods for permanent hardness.

SECTION – II

Que. – 4 A A pen stoke 60cm diameter has a shell thickness of 1.2cm .The modulus of   06
elasticity of pipe in shell material is 2.1×10^6 kg/cm^2 (2.1×10^5 N/mm^2) with
poisons ratio of ¼ and the volume modulus of elasticity of water 2.1×10^4 kg/cm^2
(2.1×10^3 N/mm^2). The pipe is designed to a discharge of water at mean velocity
of 2.1 m/sec. Determine the hammer pressure rise caused by sudden closure of
valve at the downstream end:

  (i) Neglecting the elasticity of pipe material, and

  (ii) Considering also the elasticity of pipe material.

Que. – 4 B What do you understand by "per capita demand"? Explain briefly various types   06
of water demand

<center>OR</center>

Que. – 4 A Describe with the help of neat sketches various types of joints used in CI pipe.   06

Que. – 4 B The following data shows the variation in population of a town from 1936   06
to 1966. Estimate the population of the city under 2016 by using following
methods.

    (A) Arithmetical increase method.
    (B) Geometrical increase method.
    (C) Incremental increase method.

Year	1936	1946	1956	1966
Population	75000	120000	140000	185000

Que. – 5 A A pump is to delivered water from an underground tank against a static head of   06
30 m. The suction pipe is 40m long and is 30 cm Diameter with a Darcy –
Weisbach friction factor f=0.025.The deliver pipe is of 30cm diameter, 1800m
long and has f = 0.020 the pump characteristics can be expressed as

$$Hp = 100 - 6000Q^2$$

Where, Hp = Pump Head in meter, and

Q = Discharge in m^3/sec.

Calculate the Head and Discharge of the pump.

Que. – 5 B How can you remove iron contain from rural water?   05

<center>OR</center>

Que. – 5 A How can you remove fluoride contain from rural water?   05

Que. – 5   B   Find the B.H.P and Theoretical Hp, of the Pump which lifts water from well to the   06
treatment plant with the help of following data:

Quantity of water to be lifted = 50000 m^3

Length of suction Pipe = 20 m

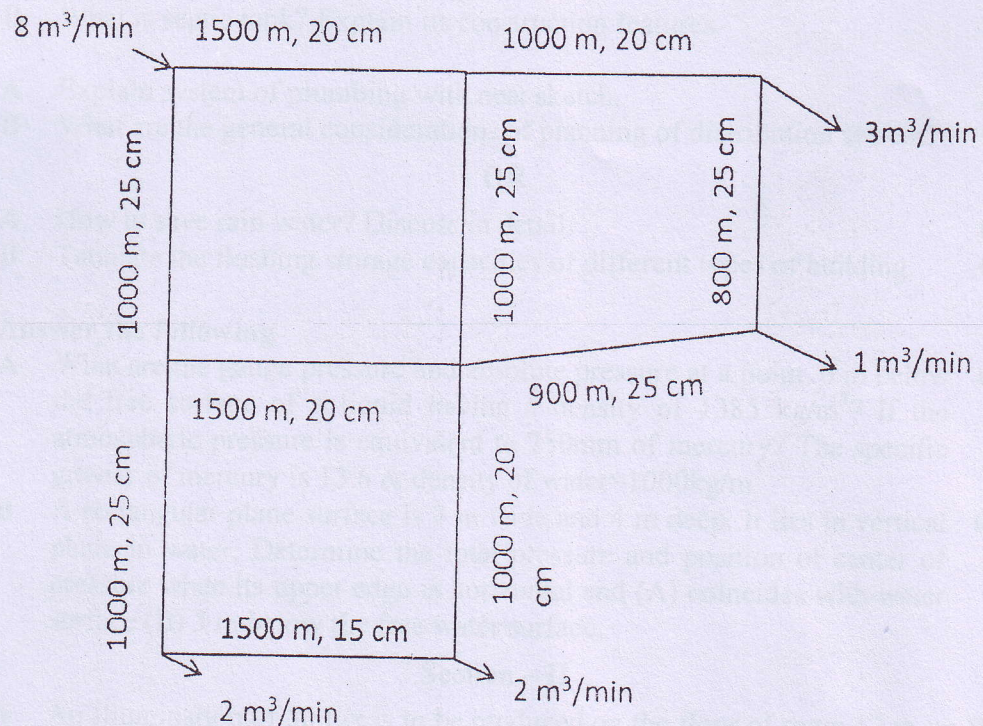Length of rising main = 180 m

Coefficient of friction = 0.025

Diameter of pipe = 0.50

Static head through which water to be raised = 20 m

Overall Efficiency =75%.

Que. – 6   A   What are the qualities required in you as a water supply project engineer?   02
Que. – 6   B   Analyze the following Pipe Network by Hardy Cross Method .Take C=100 in   10
Hazen William Formula.

END OF PAPER