B. Tech.

(SEM. V) ODD SEMESTER THEORY
EXAMINATION 2010-11

ENVIRONMENTAL ENGG.—I

Time : 2 Hours Total Marks : 50

Note :—  (1) Attempt all questions.
(2) Assume any data suitably, if required.

1. Attempt any four of the following questions :—  (3 × 4 = 12)
   (a) What are various methods to forecast the population growth in an area? Explain suitability of any four methods.
   (b) Explain the variation in the rate of demand of water. Also explain, how you take into account these variations in the design of various units.
   (c) A city has following recorded population:
       | Year | Population |
       |------|------------|
       | 1971 | 50000      |
       | 1991 | 110000     |
       | 2001 | 160000     |
   Estimate:
   (i) Saturation population
   (ii) Expected population in the year 2011.
   (d) What is turbidity? What are principles involved in the measurement of turbidity by Jackson’s turbidimeter and Nephloturbidity meter?
(e) What do you understand by demand curve? Explain the method of calculating reservoir capacity for a specific yield, from a mass inflow curve.

(f) Explain the working of a submerged intake well for a river. Also draw its sketch.

2. Attempt any four parts of the following:— (3\times4=12)

(a) Discuss advantages and disadvantages of Cast Iron, Wrought Iron, Steel and Galvanised Iron pipes.

(b) Draw neat sketches of following:
   (i) Spigot and Socket joint for CI pipe.
   (ii) Expansion joint for CI pipe.

(c) Discuss various classifications of Cement concrete pipes as per IS-458-1961. Also give suitability of each class of pipes.

(d) Draw sketches of Air release valve and pressure relief valve. Also explain the working of each.

(e) What is water hammer? Explain the mathematical equation to estimate the pressure from water hammer.

(f) Discuss the modified Hazen William's formula to compute velocity of flow and head loss due to friction in a pipe.

3. Attempt any two questions:— (6\frac{1}{2}\times2=13)

(a) Find the diameter of a 900-m long equivalent pipe ($C_{HW} = 100$) to replace the series-parallel system shown in Fig. 1. The length and diameter and $C_{HW}$ coefficients are as follows:

   pipe 1 — 300 m, 250 mm, 120
   pipe 2 — 400 m, 300 mm, 130
(a) Discuss the methods of balancing heads and balancing flows in Hardy cross methods of analysis of pipe network. Explain each method with example.

(b) Solve the following water distribution network by Newton Raphson method to calculate head at node 3 & 4 of Fig. 2.
4. Attempt any two parts of the following questions.

   \(6\frac{1}{2} \times 2 = 13\)

(a) What do you understand by the terms 'Self cleansing velocity' and 'limiting velocity' in sewers?

Also deduce following expression of self cleansing

\[ V_S = \sqrt{\frac{8\beta}{f} \left( G_S - 1 \right) g ds} \]

(b) Explain the various shape of sewer sections. Under what circumstances do you prefer egg-shaped sewer?

What are advantages of circular sewer?

(c) (i) What is Manholes? Draw a neat section of deep manhole.

Also discuss usability of drop manholes.

(ii) Explain following Sewer appurtenances:

— Grease & Oil Trap.

— Inverted Siphons.