

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: 731201**Date: 30/12/2012****Subject Name: Water Supply and Drainage****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Explain the terms: (i) Impermeability factor, (ii) Storm frequency and (iii) Duration of storm. **07**

State the factors on which the quantity of storm sewage depends.

(b) For a term it is to be found out the quantity of sanitary sewage for a separate system and for partially separate system from the following data: **07**

- (i) Population: 350 person/hect.
 - (ii) Rate of water supply: 220 lpcd
 - (iii) Storm duration: 20 min with value of $a=30$ and $b=10$
 - (iv) Percentage area of roof and pavement, yards etc. = 20 and 15 respectively with runoff coefficient 0.9 and 0.8 for roof area and pavement area respectively
 - (v) Peak discharge = $3 \times \text{DWF}$
 - (vi) The catchment area of town = 100 hectares.
- Assume any additional data if required.

Q.2 (a) Explain the loss due to sudden contraction in the pipe system. **07**

(b) A pipe 15cm diameter, 12m long is connected to the bottom of a tank 15m long by 12m wide. The original head over the open end of the pipe is 5m. Find the time of emptying the tank assuming the entrance to the pipe is sharp-edged. Also assume $f=0.02$ in $h_L = fL \frac{v^2}{2gd}$ **07**

OR

(b) Explain: (i) Medium sized intake wells and (ii) Radial well collectors. **07**

Q.3 (a) Explain the characteristics of centrifugal pumps. State the advantages and disadvantages of the same. **07**

(b) State the factors affecting the selection of a particular type of pump. **07**

A 1.2m diameter smooth concrete pipe carries a discharge of 1.0 cumec at an average temperature of 20°C . Compute the hydraulic gradient using (i) Darcy Weisbach formula (ii) Manning's formula and (iii) Hazen William's formula. Take $f=0.02$, $C=130$ and $N=0.015$

OR

Q.3 (a) Explain service reservoir in the water treatment plant and state its purposes. **07**

(b) Explain continuous and intermittent systems of supply of water. Explain intake structures with their various components giving sketch. **07**

Q.4 (a) Describe various formulae for determining storm water runoff. **07**

(b) Derive the depth and area equations for a sewer running partially full Calculate the velocity of flow and corresponding discharge in a sewer of circular section having diameter equal to 1m, laid at a **07**

gradient of 1 in 500. The sewer runs at 0.6 depths. Use Mannings formula taking $N=0.012$

OR

- Q.4** (a) Discuss Hardy Cross method for the analysis of pipe network. **07**
 (b) Determine the distribution of the flow in the pipe network as shown in Fig.1. The head loss $h_L = KQ^2$. **07**
 Take the value of K for each pipe as indicated in the figure.

- Q.5** (a) State several methods of measurement of the discharge in open channels and describe anyone in detail. **07**
 (b) The most efficient rectangular channel section is laid at a bed slope of $1/2500$ and carries water at the rate of 28 cumecs. If $N=0.02$, is the flow supercritical or sub critical? **07**

OR

- Q.5** Write Short Notes: (Any four) **14**
 (i) Capacity of elevated service reservoir.
 (ii) Equivalent pipe method for analysis of pressure in distribution system.
 (iii) Velocity distribution in open channels.
 (iv) Planning a water supply project.
 (v) Pipe appurtenances.

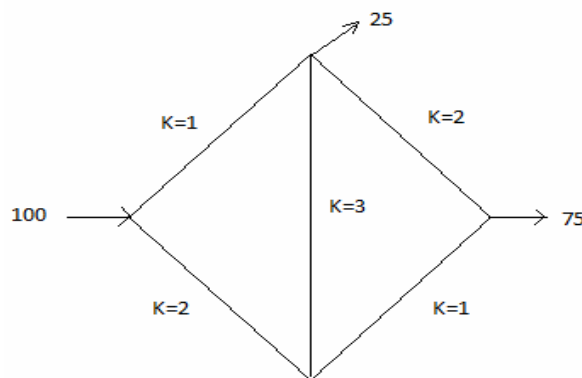


Fig. 1 Q4 (b) OR
