B.E. / B.Tech (Arrear) DEGREE END SEMESTER EXAMINATIONS APRIL/MAY 2011
CIVIL ENGINEERING BRANCH
FIFTH SEMESTER (REGULATIONS 2008)

37

CE 9304 – WATER SUPPLY ENGINEERING

Time: 3 hours Total Marks: 100

Instructions

(i) Part A carries a maximum of 20 marks and Part B carries a maximum of 80 marks
(ii) All questions in Part A carries 2 marks each and all question in Part B carries 16 marks each
(iii) Make suitable assumptions wherever necessary and state them clearly.

PART A (10X2 = 20 Marks)

1. What are the impacts of suspended solids in water bodies?
2. What are the characteristics of indicator organisms?
3. How do you determine the storage needed for an impounding reservoir?
4. Bring out the difference between gravity conduits and pressure conduits.
5. What is the significance of velocity gradient in flash mixer?
6. Distinguish between unit operations and unit processes.
7. What do you mean by adsorption isotherm?
8. List out the applications of membrane system in water treatment.
9. Why are distribution storage tanks often elevated above the ground level by a tower?
10. Bring out the difference between design and analysis of water distribution networks.

PART B (5X16 = 80 Marks)

11. Explain in brief the different methods used for prediction of future population of a city, with reference to the design of a water supply system.

12.a) i) Discuss the role of wash water troughs in rapid sand filter. How do you design them? (8)

ii) Describe the various methods of removing excess iron and manganese from ground water. (8)

(OR)

b) i) Calculate the average chlorine required per day to treat 150 ML/d of water. Also calculate the storage required for 60 days. Assume an average chlorine dosage of 5 mg/L. (4)

ii) Describe different unit operations and unit processes involved in conventional water treatment. (12)

13.a) i) In a water supply scheme to be designed for serving a population of 25 lakhs, the storage reservoir is situated at 9 km away from the city and the loss of head from the source to city is 18.5 m. Calculate the size of the supply main by using Darcy-Weisbach formula as well as by using Hazen's formula assuming a maximum daily demand of 140 Lpcd and 2/3 of the daily supply to be pumped in 10 hours. Assume coefficient of friction (f) for the pipe material as 0.005 in Weishbach formula and C_H = 110 in Hazen's formula. (10)

ii) Describe the various pipe materials used in conveyance of water. (6)

(OR)

13.b) i) Explain the difference between system head curve and pump head curve with the help of a graph. (8)

ii) What factors are required to be considered in the selection of the type of a pump? (8)

14.a) i) A municipal water supply source has a total dissolved solids (TDS) concentration of 1000 mg/L. Develop the design, and size the various components of a reverse osmosis system, to produce finished water having a TDS concentration of less than 300 mg/L. The plant capacity is 19,000 m^3/d. Use the following data:

Plant design capacity: Q	19,000 m^3/d
Recovery factor: R	75 percent
Salt-rejection factor, S	95 percent
Design pressure, P	4140 kN/m^2
Feed water temperature, T	27°C
TDS in raw water	1000 mg/L
TDS in finished water	300 mg/L
Flux rate	0.82 m^3/m^2/d

(OR)

b) i) Sodium hydroxide solution is needed to regenerate activated alumina bed. A 1.5 percent solution at a volumetric loading rate of 0.6 L/s/m^3 is used for 1 hour. Calculate the volume of the bed if total quantity of NaOH solution consumed is 5L. (4)

ii) Describe the different methods of water softening. (12)

15. a) Determine the balanced flows and head losses in the water supply distribution network shown in Fig.1 using Hardy-Cross method (stop with two iterations). C_H value for all the pipes = 110.

Pipe	Diameter, mm	Length, m
AB	300	1000
BC	200	2500
BD	300	3000
AD	400	3500
DC	200	600

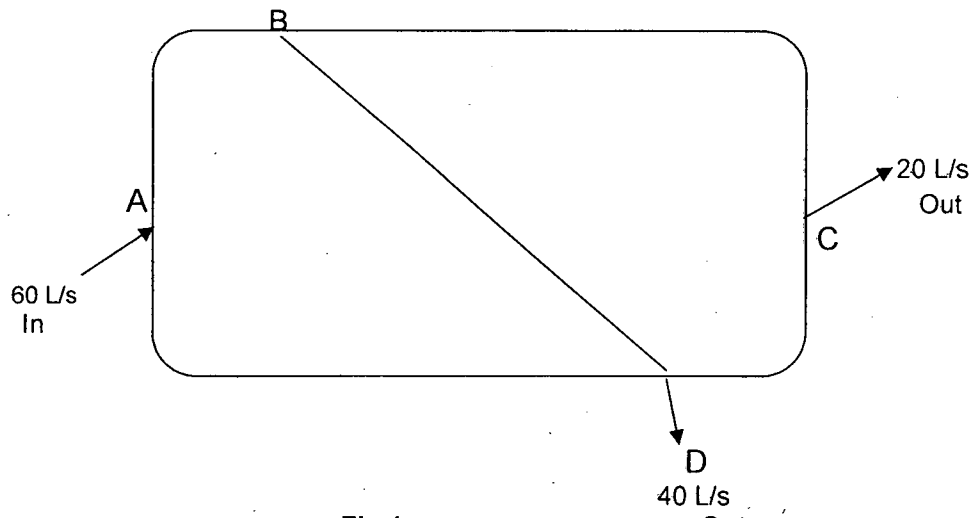

Fig.1

(OR)

b) State briefly the basic principle governing the design of water supply in buildings with particular reference to the quantity of flow, the determination of pipe sizes and the layout of the pipe system.

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