FACULTY OF ENGINEERING

B.E. 3/4 (Civil) II Semester (Main) Examination, May/June 2011
WATER & WASTE WATER ENGINEERING

Time : 3 Hours]   [Max. Marks : 75

Note : Answer **all** questions from Part – A. Answer any **five** questions from Part – B.

PART – A   (Marks : 25)

1. What are all the factors to be considered in the planning of a water supply scheme for a city ?   2

2. Name the factors which affect the rate of demand.   2

3. Mention the various impurities in water which should be taken into account in deciding the potability of water.   2

4. Distinguish between slow sand and rapid sand filters with reference to rate of filtration, filter media, period of cleaning, loss of head.   3

5. Name the various methods of distributing water and discuss the advantages of each.   2

6. What do you understand by the terms 'Self cleaning velocity' and 'limiting velocity' in sewers ?   2

7. What do you understand by secondary treatment of sewage ? Enumerate various treatment techniques used for biological treatment.   3

8. What is a grit chamber ? Describe with the help of a neat sketch, a horizontal flow grit chamber.   3

9. Explain briefly the functioning of a septic tank and also discuss its design aspects.   3

10. What is meant by solid waste management ? Describe briefly.   3

PART – B   (Marks : 50)

11. A pipe network consists of the following pipes :   10

Pipe	Length (m)	Diameter (mm)	Friction factor
AB	500	300	0.015
BC	700	300	0.010
AD	600	400	0.012
DC	600	250	0.012

Inflow at A is 1.2 m^3/s while inflows at B, C and D are 0.4, 0.5 and 0.3 m^3/sec respectively. Find the flow in each pipe. If the pressure head at 'A' is 100 m of water, determine the residual pressure head at point C.

12. (a) Design six slow sand filter beds from the following data and show the arrangement of beds in plan : 7
Population to be served : 50,000 persons
Quantity of water to be supplied : 200 lts/head/day
Rate of filtration : 300 lts/sqm/day
Length of each bed is twice the breadth.

   (b) Define 'flow through period' and detention tank in a sedimentation tank. 3

13. (a) A waste water effluent of 560 lts/sec with a BOD = 50 mg/lt, D.O. = 3.0 mg/lt and temperature of 23 °C enters a river where the flow is 28 m³/sec and BOD = 4.0 mg/lt, DO = 8.2 mg/lt and temperature of 17 °C, K for the waste is 0.10 per day at 20 °C. The velocity of water in the river downstream is 0.18 m/s and depth of 1.2 m. Determine the following after mixing of waste water with the river water. 7
   (i) Combined discharge   (ii) BOD
   (iii) DO, and   (iv) Temperature

   (b) How do you estimate the volume of stormwater by rational method ? 3

14. (a) Determine the size of a high rate trickling filters for the following data : 7
   (i) Sewage flow = 4 mld
   (ii) Recirculation ratio = 1.4
   (iii) BOD of raw sewage = 260 mg/lt
   (iv) BOD removal in primary clarifier = 35%
   (v) Final effluent BOD desired = 40 mg/lt.

   (b) What is sedimentation ? Why sedimentation is required in sewage treatment ? 3

15. (a) Discuss various types of solid wastes or dry refuse. Give the composition of solid wastes for an average Indian city. 5
   (b) Design a septic tank for 200 users, water allowance is 120 lts/head/day. Detention period may be taken as 8 hrs. Draw a neat dimensioned sketch of a septic tank you design. 5

16. (a) The 5 day 20 °C BOD of a wastewater is 210 mg/lt. What will be the ultimate BOD ? What will be the 10 day demand ? If the bottle has been incubated at 30 °C, what would be the 5 day BOD have been ? At 20 °C K = 0.1/day. 5
   (b) Describe the methods of low cost waste treatment oxidation pond, RBC. 5

17. Discuss about the following : 10
   (i) Water distribution systems
   (ii) Disinfection – Necessity and methods
   (iii) Sewer types and appurtenances

_____