53 (CE 404) ENEN-I

2017

ENV. ENGG. -I

Paper : CE 404

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* Discuss the logistic curve method for determining the future population of a locality. Derive a standard equation for such a curve and explain its use for determining the future population. 5

(b) What is the difference between a confined aquifer and an unconfined aquifer? Derive an expression for determining the discharge from an unconfined aquifer. 10

(c) A rectangular settling Tank without Mechanical equipment is to treat 25 million litres per day of raw water. The sedimentation period is to be 6 hours, the velocity of flow is 8*cm/minute*, the depth of water is 3*m*, what should be

(i) the length of the Basin ?

(ii) the width of the Basin ? 5

2. (a) Design a rapid sand filter unit for 4*million* litres per day of supply. Assuming rate of filtration to be 5000 *litres/hr/m*^{2}, 4% of filtered water is required for washing of filter every day. 15

(b) Discuss the steps to be taken to prevent waste of water in the distribution system. 5

3. (a) Explain *any one* type of automatic rain gauge. 5

(b) What do you understand by Mass inflow curve and how is it prepared ? 5

(c) Describe in brief various tests conducted for physical examination of water. 10

4. *(a)* For water supply of a town, water is pumped from a river 3*km* away into a reservoir. The maximum difference of levels of water in river and the reservoir is 20*m*. The population of the town is 50,000 and per capita water demand is 120 litres per day. If the pumps are to operate for a total of 8 hours and the efficiency of pumps is 80%, determine the HP of the pumps. Assume friction factor as 0·03, the velocity of flow as 2*m/s* and Maximum daily demand as 1·5 times the Aug daily demand. 10

(b) Differentiate between Slow Sand filter and Rapid Sand filter. 10

5. *(a)* Match the words under process with the corresponding appropriate words under impurity removed. 8

Process	**Impurity Removed**
(1) Aeration	(a) larger suspended solids
(2) Screening	(b) Dissolved solids
(3) Plain settling	(c) Pathogenic microbes
(4) Filtration	(d) Colloids and microbes
(5) Disinfection	(e) Taste and odour
(6) Zeolite process	(f) fine suspended solids
(7) Settling plus coagulation	(g) floating solids
(8) Chemical treatment plus filtration	(h) Hardness

(b) A 30 *cm* diameter well penetrates 25*m* below the static water table. After 24 hours of pumping @ 5400 litres per minute, the water level in a test well at 90*m* is lowered by 0·53*m* and in a well 30*m* away the drawdown is 1·11*m*.

(i) What is the transmissibility of the aquifer ?

(ii) Also determine the drawdown in the main well. 10

(c) Compute the fire demand for a city having population of 1,40,000 using Kuichling's formula and Buston's formula. 2

6. (a) Write short notes on : 3×4=12

(i) Water Aeration

(ii) Break point chlorination

(iii) Hardness.

(b) Explain different types of distribution networks. 8
