



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech(CE-Old)/SEM-5/CE-503/2012-13

2012

ENVIRONMENTAL ENGINEERING

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :
 $10 \times 1 = 10$

- i) The average daily water consumption of a city is 30000 cu.m. The maximum daily demand in such a case will be
- a) 48000 cu.m b) 36000 cu.m
- c) 30000 cu.m d) none of these.
- ii) The ratio of maximum daily demand to average daily demand is
- a) 1.8 b) 1.6
- c) 1.48 d) 2.7.



iii) Water supply projects under normal circumstances are designed for a design period of

- a) 25 years b) 35 years
- c) 30 years d) 20 years.

iv) Which of the following is not a sub-surface source ?

- a) Storage reservoirs
- b) Springs
- c) Infiltration galleries
- d) Tube wells.

v) Discharge per unit draw down in case of an aquifer is known as

- a) specific yield
- b) specific capacity
- c) field capacity
- d) none of these.



vi) What percentage of fresh water is surface water ?

- a) 2.5% b) 2%
- c) 3.2% d) 1.5%.

vii) If present in water, chlorination of water does not reduce the

- a) ammonia content
- b) organic matter content
- c) B.O.D.
- d) dissolved oxygen content.

viii) The efficiency of sedimentation tank does not depend upon

- a) detention time
- b) depth of the tank
- c) length of the tank
- d) horizontal velocity of water.



ix) Safe water is one which does not contain

- a) pathogenic bacteria b) turbidity
- c) any colour d) any test.

x) Temporary hardness in water is caused by

- a) bi-carbonates of Ca^{++} and Mg^{++}
- b) sulphates of Ca^{++} and Mg^{++}
- c) chlorides of Ca^{++} and Mg^{++}
- d) nitrates of Ca^{++} and Mg^{++} .

xi) If total hardness of water is greater than its total alkalinity the carbonate hardness will be equal to

- a) total alkalinity
- b) total hardness
- c) total alkalinity – total hardness
- d) non-carbonate hardness.



GROUP - B
(Short Answer Type Questions)

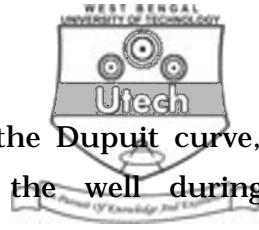
Answer any *three* of the following. $3 \times 5 = 15$

2. What is per capital demand ? Explain the factors on which per capital demand depends.
3. What do you mean by a confined and an unconfined aquifer ?
4. Explain the Arithmetic Increase Method, Geometric Increase Method and Incremental Increase Method.
5. Explain briefly :
 - i) break point chlorination
 - ii) super chlorination
 - iii) post and prechlorination.

GROUP - C
(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

6. a) Derive the Dupuit's expression for yield of an confined aquifer, clearly stating the assumptions and the terms used in deriving the formula. 7
- b) A 50 cm diameter well is being pumped at a rate of 1460 l/min. Measurements in a nearby test well were made at the same time as follows. At a distance of 8 m from the well being pumped, the drawdown was 6 m and at 15 m, the drawdown was 1.5 m. The bottom of the well is 90 m below the ground water table.
 - i) Find the coefficient of permeability



- ii) If all observed points were on the Dupuit curve, what was the drawdown in the well during pumping ?
- iii) What is the specific capacity of the well ?
- iv) What is the maximum rate at which water can be drawn from this well ?

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7. a) In two periods of each of 20 years, a city has grown from 50,000 to 4,70,000 and then to 8,00,000.

Determine :

- i) the saturation population
 - ii) the equation of the logistic curve
 - iii) the expected population after the next 20 years. 5
- b) With the help of the following data; estimate the population of the city the years 2020, 2030 and 2040 using (i) Geometric Increase Method (ii) Incremental Increase Method : Comment on the two methods on the basis of the values obtained : 10

Year	Population
1930	25000
1940	27500
1950	34100
1960	41500
1970	47050
1980	54500
1990	61000



8. a) The design annual rainfall for the catchment of a proposed reservoir has been computed to be 99 cm. The catchment area has been estimated to have the mean annual temperature of 20°C. The catchment area contributing to the proposed reservoir is 1000 sq.km. Calculate the annaul design yield for this reservoir (Use Khosla's formula) 8
- b) Explain the comparative graphical method in connection to population forecasting. 7
9. Write short notes on the following : 3 × 5
- a) Total solids
 - b) Water softening
 - c) Logistic curve method.
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