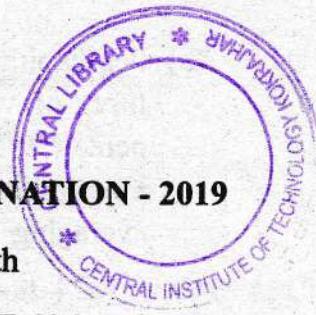


Total No. of printed pages = 8



END SEMESTER EXAMINATION - 2019

Semester – 5th

Subject Code : CT-506

ENVIRONMENTAL ENGINEERING

Full Marks – 70

Time – Three hours

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

PART – A

Marks – 25

All questions are compulsory.

1. (a) Increase in population of a rapidly growing city, may be estimated by
 - (a) Arithmetic increase method
 - (b) Geometric increase method
 - (c) Incremental increase method
 - (d) All of the above

[Turn over

(b) Per capita water demand is defined as the litres of water consumed everyday by each person. It has to be some average value, over a period of time. Over how much period, the averaging is done here ?

- (a) 24 hours
- (b) 10 years
- (c) 1 year
- (d) 30 years

(c) The average domestic water consumption per capita per day for an Indian city, as per IS 1172-1993 may be taken as

- (a) 1351/c/d
- (b) 2101/c/d
- (c) 2401/c/d
- (d) 2701/c/d

(d) As compared to the geometrical increase method of population forecasting, the arithmetical method gives future population of a city, the factor to be considered, is

- (a) Equal value
- (b) Lesser value
- (c) Higher value
- (d) May vary on population figures

77/CT-506/EEngg (2)



(e) Blue baby disease is caused due to

- (a) Chlorides
- (b) Nitrites
- (c) Nitrates
- (d) Sulphide

(f) Water losses in water supply system are assumed as

- (a) 5%
- (b) 7%
- (c) 15%
- (d) 55%

(g) Modern turbidimeters, working on the principle of scattering of light are known as

- (a) Spectrometers
- (b) Tintometers
- (c) Nephelometers
- (d) Optimeters

(h) The suitable method for disinfection of swimming pool water is

- (a) UV rays treatment
- (b) Lime treatment
- (c) Chlorination
- (d) By adding potassium permanganate

77/CT-506/EEngg (3) [Turn over

- (i) The suitable layout for a water supply distribution system, for a city of roads of rectangular pattern is
- Dead end system
 - Grid iron system
 - Ring system
 - All of the above
- (j) Disinfection of water helps in
- Killing pathogenic bacteria
 - Removing turbidity
 - Removing hardness
 - Sterilization
- (k) Mostly used coagulant is chlorine. (True / false)
- (l) Permanent hardness of water can be removed by Zeolite process. (True/false)
- (m) Cleaning of rapid sand filter is done by backwashing. (True/false)
- (n) BOD of treated water should be nil. (True / false)
- (o) pH of water indicates only its acidity. (True / false)



- (p) Baylis turbidimeter is preferred when turbidity value is less than 5 ppm. (True/false)
- (q) Water is considered hard if its hardness is in the order of 50 ppm. (True/false)
- (r) Dental caries in children may be caused due to water supplies which are deficient in fluorides. (True/false)
- (s) To remove very fine suspended particles from water, the method adopted is called sedimentation process. (True/false)
- (t) The bacteria which survive in the absence of oxygen are called B-coli. (True/false)
- (u) One degree of hardness of water means a content of salts of _____ mg/l.
- (v) Maximum threshold number permitted for indicating the odour of public water supplies is _____.
- (w) The total domestic consumption in a city water supply is assumed to be _____ %.
- (x) The limit of chloride in drinking water as per IS Code is _____.
- (y) If G is the specific gravity of particles of diameter d, the velocity of settlement V in still water at T°C, according to Stoke's law, is _____.

PART - B

Marks - 45

All questions are compulsory.

2. (i) Explain the various treatment processes that are adopted in water treatment plant. 10
- (ii) Describe dry methods of application of coagulants. 5

Or

- (i) Derive Stoke's law for settlement of discrete particles in water.
- (ii) Discuss briefly the necessity of replacing the conservancy system by the water carriage system of sanitation. State the factors on which the storm water flow on an area depends. 8

3. A town has a population of 80,000 persons with a per capita water supply of 180 litres per day of which 80% of it appears as sewage. Design a sewer running 0.5 times full at maximum discharge. Take a constant value of $N = 0.013$ at all depths of flow. The sewer is to be laid at a slope of 1 in 400. 5

77/CT-506/EEngg (6)

Or

For a small town having projected population of 30,000 residing over an area of 20 hectares, find the design discharge for the combined sewer for the following data :

Rate of water supply = 150 litres per capita per day

Runoff coefficient = 0.4

Time of concentration = 30 min.

Assume 70% of this water supply will be reaching the sewer as sanitary sewage. 5

4. Design a rapid sand filter to treat 4 million litres of raw water per day. Half an hour per day is used for backwashing. The rate of filtration is 5000 l/h/m² of bed. Assume necessary data. 10

Or

Draw a neat sketch of slow sand filter and describe how it works. Compare slow sand filter and rapid sand filter. 10

5. Explain the terms : 2×5=10
- Detention period
- Screening
- Super chlorination
- Coagulation
- Disinfection.

77/CT-506/EEngg (7)

[Turn over

Or

- (i) Design a plain sedimentation tank to treat 6 million litres water per day. Take a detention period of 8 hours and assume a depth of 3.5m. 5
- (ii) Find the settling velocity of a silica particles of specific gravity 2.65 at 20°C, if the diameter of particles 0.02 cm. 5
6. Describe various types of coagulant commonly used in water treatment. 5

Or

Explain in brief various disinfecting agents. 5

