

May 2017

ENVIRONMENTAL ENGINEERING*Time Allowed: 3 Hours**Full Marks: 70*

Answer to Question No.1 is compulsory and to be answered first.

This answer is to be made in separate loose script(s) provided for the purpose. Maximum time allowed is 45 minutes, after which the loose answer scripts will be collected and fresh answer scripts for answering the remaining part of the question will be provided.

On early submission of answer scripts of Question No.1, a student will get the remaining script earlier.

Answer any five questions from the rest.

1. A. Choose the correct one from the given alternatives: 1x10
- i) The suitable method for forecasting population for a young and rapidly developing city is – (a) Arithmetic mean method, (b) Geometric mean method, (c) Comparative graphical method, (d) None of these.
 - ii) The devices which are installed for drawing water from different water sources are called – (a) filters, (b) outlets, (c) intakes, (d) inlets.
 - iii) The valve which is provided in the water distribution pipes at street corners and pipe junctions to control the flow in the distribution system is – (a) relief valve, (b) reflux valve, (c) sluice valve, (d) None of these.
 - iv) Waters are considered "soft" if their hardness is of the order of – (a) 75 ppm, (b) 150 ppm, (c) 125 ppm, (d) 300 ppm.
 - v) When fluoride concentration in water exceeds 1.5 mg/l or so, the disease that may be caused, is – (a) Methaemoglobinemia, (b) Fluorosis, (c) Dental caries in children, (d) Poliomyelitis.
 - vi) The most economical and hygienic rural privy is – (a) an aqua-privy, (b) a privy pit, (c) a cess pool, (d) vault privy.
 - vii) The secondary treatment of sewage is caused by – (a) bacteria, (b) algae, (c) coagulants, (d) none of them.
 - viii) The specific gravity of sewage is – (a) zero, (b) slightly less than 1, (c) equal to 1, (d) slightly greater than 1.
 - ix) The gas which is generally found present in sewers is – (a) H₂S, (b) CO₂, (c) CH₄, (d) all of these.
 - x) Sewage treatment works are normally designed for a design period of – (a) 40-50 years, (b) 30-40 years, (c) 15-20 years, (d) 5-10 years.
 - xi) The polluting gas, which is primarily responsible for causing the green house effect and global warming – (a) sulphur dioxide, (b) hydrogen sulphide, (c) carbon dioxide, (d) none of them.
 - xii) Standard BOD of water is taken for – (a) 2 days, (b) 3 days, (c) 5 days, (d) 10 days.

- xiii) Under normal situations, the most commonly used pipe material for disposing waste water is – (a) cast iron, (b) stone ware, (c) steel, (d) asbestos cement.

B. Answer the questions (any ten):

1x10

- i) If the average daily water consumption of a city is 24000 cum, the peak hourly demand (of the maximum day of course) will be _____. <https://www.wbsctonline.com>
- ii) The colour of water can be determined on an instrument, is known as _____.
- iii) Detention time for a sedimentation tank (continuous flow type), is given for a tank, passing a discharge Q, and having a length L, width B, and a depth H, as _____.
- iv) The most widely used coagulant for water-treatment, is _____.
- v) Chlorine demand of water is equal to _____.
- vi) EIA stands for _____.
- vii) DWF stands for _____.
- viii) Bacteria which can survive with or without oxygen are known as _____.
- ix) The recommended maximum noise level in a residential building is _____.
- x) Blue baby syndrome is caused by presence of excess amount of _____ in drinking water.
- xi) Self-cleansing velocity for circular C.I or brick sewer is considered as _____.
- xii) The quantity of liquid which flows in sewer during the period of rainfall is known as _____ sewage.
- xiii) A detritus tank is provided in the primary treatment of sewage to remove _____.

2. a) Describe briefly different techniques of purification of water. 5+5
 b) Differentiate between slow sand filter and rapid gravity filter.

3. a) Find out the population in the year 2010 & 2020 using by G.P. method from the census data given below:

Year	1960	1970	1980	1990	2000
Population	25000	28000	34000	42000	47000

- b) Explain the term C.O.D. 7+3

4. Write short notes on any four of the followings: 2½x4

- a) Coagulants
- b) Jar test
- c) Aeration
- d) Disinfection
- e) Break point of chlorination
- f) Dechlorination

5. a) Name the different layout system used for pipe lines for distribution of water. Briefly discuss any of one with neat sketches.

- b) What do you mean by characteristics of water? Write short notes on nitrogen content. 5+5

6. a) Define Environment. How soil pollution can be controlled?

- b) Write short notes on – (i) Incineration, (ii) Composting.

- c) Describe shortly pollution characteristics & suggestive treatment of industrial waste water from Pulp Industry. (1+2)+(2½x2)+2

7. a) What is combined system of sewerage?
b) Design a circular sewer so as to supply to a residential colony in a town having the following data:
Area of colony = 40 hectares, Population = 9000, per capita water consumption = 170 lpcd,
Critical design rainfall intensity = 4 cm/hr, Impermeability factor = 0.55, general available ground
slope = 1 in 900, Assume suitable data if needed. 3+7
8. a) Define (any four) – (i) Sewerage, (ii) Sewage, (iii) Sewer, (iv) Sullage, (v) Soil pipe, (vi) Waste
pipe canal fall.
b) What is Trap? Describe shortly different type of trap with neat sketches. (1x4)+(1x5)
9. a) Design the dimension of a septic tank for a colony of 150 persons provided with an assumed water
supply from the municipality head works at a rate of 120 litres per person per day. Assume any
data you may need. Show details drawing.
b) Draw a neat sketch showing plumbing system for G+3 residential building using underground and
overhead tank supply. 7+3
10. a) State different methods involves in biological treatment of sewage.
b) Write short notes on – (i) Activated sludge process, (ii) Oxidation pond.
c) Name the different types of "PRIVIES". Discuss briefly with neat sketches construction and
working process of borehole type latrine. 3+(2x2)+3
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