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Roll No.

320653(20)

B. E. (Sixth Semester) Examination, April-May 2020

(New Scheme)

(Civil Engg. Branch)

ENVIRONMENTAL ENGINEERING-I

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Part (a) of each question is compulsory carries 02 marks. Attempt any two parts from (b), (c) & (d) carries 7 marks each.

Unit-I

1. (a) Enumerate the 5 factors governing the selection of a particular source of water for a water supply project.

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- (b) Explain (i) the various surface sources and underground sources. (ii) Type of intake works for a water purification plant.

The following data shows the variation in population of a town from 1962 to 2012. Estimate the population of the city in the year 2042. Use 3 methods :

Year	Population
1962	65,000
1972	73,000
1982	1,01,500
1992	1,34,000
2002	1,67,000
2012	2,32,000

- (c) Discuss the merits and demerits of river water sources and ground water source for the water supply scheme for a town. Compare the advantages and disadvantages of ground / water supply and surface water supply schemes.
- (d) From the census data given below, estimate the population of the city for the year 2000 A.D.

Year	Population
1940	22610
1950	13851
1960	36640
1970	45520
1980	53460
1990	63210
2000	70320
2010	76540

Unit-II

2. (a) Name 4 coagulants and their chemical formulae.
- (b) Explain the significance of the following in drinking water :
- Ammonia
 - Chloride content
 - Methane gas
 - Coliforms
- (c) Water works of a town is provided with sedimentation tank of size $40 \times 15 \times 3.5$ m. If 115 ppm suspended solids are present in the water and 60%

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are removed in the basin, and the average specific gravity is 2.1, determine the following, if 8.5×10^6 litres of water is treated daily.

- (i) Detention time,
 - (ii) Average flow of water through the tank.
 - (iii) Deposition of the solids in the tank.
 - (iv) Overflow rate.
- (d) Water works of a town treat 25×10^6 l/day. Quantity of filter alum consumed is 21 mg/l. If raw water has an alkalinity of 4.6 mg/l of CaCO_3 , determine the amount of filter alum and quick lime (containing 80% of quicklime) required annually at the water works.

Unit-III

3. (a) (i) Write the formula for chloramines.
(ii) What is the theory of filtration?
- (b) Explain the Horizontal Gravity Pressure filter with a neat sketch.
- (c) Explain the role of chlorine as disinfectant. Also name for dechlorination agents.

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- (d) Explain the function of bleaching powder as disinfectant. It is required to treat 5×10^6 litres of water with 0.4 mg/litre of chlorine. If the disinfectant is in the form of bleach that contains 35% of available chlorine, how many kg of bleaching powder are needed to treat the daily flow of water?

Unit-IV

4. (a) What are the deciding factors in determining the storage capacity of service reservoirs?
- (b) Explain the types of fire hydrants with appropriate sketches.
- (c) Explain any two methods of removing permanent hardness in water.
- (d) Design a water softening plant for a water works having the following data :
- (i) Hardness in the water = 450 mg/litre as CaCO_3
 - (ii) Quantity of water to be treated = 22000 litre/hour
 - (iii) Allowable hardness after treatment in the work = 75 mg/litre as CaCO_3
 - (iv) Ion exchange capacity of the resin to be used in the plant = 10 kg of hardness/cu m

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- (v) Salt required for regeneration of the resin =
55 kg/cuM of the resin

The water softening plant works for 2 shifts of 8 hours per day. Assume any suitable data where necessary.

Unit-V

5. (a) Mention the causes of Air Pollution.
- (b) Explain the effects on air pollution on plants and livestock.
- (c) Describe any two precleaning devices to control air pollution (with neat sketches).
- (d) What are the various air pollution control methods? Describe any 3 major air pollution control equipments.