

B.E. Eighth Semester (Civil Engineering) (C.B.S.)
Elective - III : Water & Waste Water Treatment Paper - I

P. Pages : 3

Time : Three Hours



KNT/KW/16/7545

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Assume suitable data whenever necessary.
 9. Diagrams and chemical equations should be given whenever necessary.
 10. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Explain the factors to be considered while selecting the site for water treat plant. **6**
- b) Draw a flow diagram of conventional water treatment plant and explain the function of each unit in brief. **7**

OR

2. a) Write short note on gas transfer in aeration process. **6**
- b) Design the cascade type aerator for the design flow of 15 MLD. **7**
3. a) Write down the factors affecting coagulation and flocculation. **6**
- b) Design a clariflocculater for design flow of 500 m³/hr. Assume suitable data. **7**

OR

4. a) State the types of coagulants used in water treatment and explain any one. **6**
- b) Design a flash mixer for design flow of 10 MLD. **7**
5. Design completely the rapid sand filter for following data. **13**
- 1) Population to be served = 75,000 persons.
 - 2) Quantity of water to be supplied = 150 LPCD.
 - 3) Rate of filtration = 4500 Lit/hr/m².
 - 4) Filter water required for back washing = 3%.

OR

6. a) State the difference between slow sand and rapid sand filter. **6**

b) Result of chlorine demand test on raw water as given below.

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Sample No.	Chlorine dose (mg/lit)	Residual chlorine after 10 min. contact (mg/lit)
01	0.2	0.19
02	0.4	0.36
03	0.6	0.50
04	0.8	0.48
05	1.0	0.20
06	1.2	0.40
07	1.4	0.60
08	1.6	0.80

Sketch chlorine demand curve. What is break point dose and what is the chlorine demand at dose of 1.2 mg/lit?

7. a) Write down the characteristics of wastewater.

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b) The following observations were made on a 3% dilution of waste water for measuring BOD.

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i) Dissolved Oxygen (D.O.) at aerated water used for dilution = 3.0 mg/lit.

ii) Dissolved Oxygen (D.O.) of diluted sample after 05 days incubation = 0.8 mg/lit.

iii) Dissolved Oxygen (D.O.) of original sample = 0.6 mg/lit.

Calculate the BOD of 5 days & ultimate BOD of the sample assuming that the deoxygenation constant 0.1.

OR

8. a) Write a short note on the broad irrigation & sewage farming.

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b) What is 'oxygen sag curve' in stream pollution. Explain with sketch.

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9. a) Draw the conventional flow diagram of waste water treatment plant and explain the function of each unit in brief.

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b) Design the grit chamber for design flow of 15 MLD. Average temperature of sewage is 20°C. Specific gravity of grit particle is 2.65 and diameter of grit particle to be removed is 0.2 mm.

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OR

10. a) Explain the various types of screens used in waste water treatment plant.

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b) Design bar screen channel for the peak flow of 40 MLD. Also calculate the length of channel. 7
Data given.

- 1) Size of bar = 15 mm x 50 mm.
- 2) Clear spacing between bar = 30 mm.
- 3) Angle of inclination of screen = 45°.
- 4) Diameter of incoming sewer = 0.65 m.

11. a) Design the activated sludge treatment unit with the following data, for a town of population 70,000. 7

- 1) Average sewage flow = 210 lit/cap/day.
- 2) BOD of raw sewage = 200 mg/lit.
- 3) Suspended solids in raw sewage = 300 mg/lit.
- 4) BOD removed in primary treatment = 40%.
- 5) Overall BOD removal desired = 90%.

b) Explain working of sludge drying beds with neat sketch. 6

OR

12. a) Write down the factors affecting anaerobic digestion tank. 6

b) Write notes on **any two**. 7

- 1) Trickling filter.
- 2) Sludge digester.
- 3) MLSS & MLVSS.
- 4) BOD/COD ratio.
