B.TECH. DEGREE EXAMINATION, OCTOBER-2022

Semester IV [Second Year] (Regular)

WASTE WATER ENGINEERING

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following in brief:
    (a) What is meant by sanitation?   CO1
    (b) Write any two types of pumps.   CO1
    (c) Write any two locations of manholes.   CO1
    (d) What is meant by soak pits?   CO2
    (e) Define decomposition.   CO2
    (f) What is difference between BOD and COD?   CO2
    (g) What is meant by aeration?   CO3
    (h) What is the working principle of trickling filters?   CO3
    (i) Define Sludge Volume Index.   CO3
    (j) Write factors effecting dilution.   CO4
    (k) Define sewage sickness.   CO4
    (l) What is the purpose of using traps   CO4
    (m) What is meant by waste pipe?   CO4
    (n) What is meant by sludge?   CO4

UNIT – I

2. (a) What are the various types of sewerage
         systems? Explain along with merits and
         demerits.   (7M) CO1
    (b) What are the various types of pumps? Explain
         in detail.   (7M) CO1

(OR)

3. (a) What are the various types of sewer appurtenances? Explain about inverted siphons in detail. (7M) CO1

(b) The catchment area of a city is 300 hectares, runoff coefficient is 0.44 and maximum intensity of rainfall is 40 mm/hour. If the density of population is 200 persons/hectare and the rate of water supply is 200 liters/capita/day, calculate the quantity of sewage for (i) separate system (ii) for partially separate system. (7M) CO1

UNIT – II

4. (a) Explain biological characteristics of sewage in detail. (7M) CO2

(b) Design a septic Tank for 50 persons with average daily sewage flow of 100 lpcd. (7M) CO2

(OR)

5. (a) What are the various types of sedimentation tanks? Explain in detail. (7M) CO2

(b) Derive BOD equation to determine BOD of a given water sample. (7M) CO2

UNIT – III

6. (a) What are the various methods of aeration? Explain in detail. (7M) CO3

(b) The colony of the industrial estate has population of 2500 persons. The sewage flow is 125 litres/capita/day. The 5 day BOD of the sewage is 350 ppm. Design the oxidation pond for the treatment of the sewage. Assume any data required. (7M) CO3

(OR)

7. (a) Explain about activated sludge process along with merits and demerits. (7M) CO3

(b) What is meant by sludge bulking? Explain various operational factors affecting sludge bulking. (7M) CO3

UNIT – IV

8. (a) Explain various sewage irrigation methods in detail. (7M) CO4

(b) What are various sludge disposal methods? Explain in detail. (7M) CO4

(OR)

9. (a) What are the various sanitary fittings in house plumbing? Explain with neat sketches. (7M) CO4

(b) Explain various stages of sludge digestion in detail. (7M) CO4

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CE225(R20)

B.TECH. DEGREE EXAMINATION, JANUARY-2023

Semester IV [Second Year] (Supplementary)

WASTE WATER ENGINEERING

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) What is sewerage?   CO1
   (b) Define Sullage.   CO1
   (c) Why sanitary sewer should never run full?   CO1
   (d) When two or more sewers of different diameters meet
       at a manhole, how do you align them?   CO1
   (e) Differentiate between BOD and COD.   CO2
   (f) What is biological oxidation?   CO2
   (g) What is the purpose of screening?   CO3
   (h) What is the objective of the recirculation in trickling
       filter?   CO3
   (i) What is sludge volume index?   CO3
   (j) What is sewage sickness?   CO3
   (k) List out various stages in sludge digestion.   CO4
   (l) What is sewage farming?   CO4
   (m) Mention the conditions for disposal of sewage by
       dilution.   CO4
   (n) What is gully trap in drainage system?   CO5

UNIT – I

2. (a) What is sewer? Briefly explain the types of
       sewers?   (6M) CO1
   (b) Design a combined sewer of a circular section is
       to be laid to serve a particular area from the
       following data: (8M) CO1

Area to be served	= 120 hectares
Population	= 1,00,000
Maximum permissible flow velocity	= 3 m/sec
Time of entry for storm water	= 10 minutes
Time of flow in channel	= 20 minutes
Per capita water supply	= 250 lpcd
Coefficient of run-off	= 0.45
Hourly, maximum rainfall for the area = 5 cm	

(OR)

3. (a) List out the sewer appurtenances. Explain the working of any three sewer appurtenances with sketch. (7M) CO1

   (b) What is the necessity of sewage pumping? Discuss the classification of pumps. (7M) CO1

UNIT – II

4. (a) Derive an expression for first stage BOD. (7M) CO2

   (b) Determine the 1 day & 3 day 37°C BOD of sewage sample whose 5 day 20°C BOD is 100 mg/l. Assume K_D at 20°C as 0.1 (7M) CO2

(OR)

5. (a) Discuss the septic tank effluent disposal methods. (7M) CO2

   (b) Discuss the various unit operations involved in preliminary treatment of sewage. (7M) CO2

UNIT – III

6. (a) Design a standard rate trickling filter to treat the sewage of 90,000 people provided with water supply of 150 lpcd. The BOD of the influent is 250 mg/l and that of the effluent not more than 30 mg/l. (7M) CO3

   (b) Explain the operational troubles of a standard rate trickling filter and their remedies? (7M) CO3

(OR)

7. (a) Compare & contrast between trickling filter and activated sludge process. (7M) CO3

   (b) Explain the functioning of oxidation of pond with a neat sketch. (7M) CO3

UNIT – IV

8. (a) Discuss the factors affecting the sludge digestion process. (7M) CO4

   (b) Explain the method of dewatering and disposal of sludge by sludge drying bed with neat sketch? (7M) CO4

(OR)

9. (a) Explain the plumbing systems of house drainage? (7M) CO4

   (b) What is trap? Explain different types of traps with neat sketches? (7M) CO4

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CE225 (R20)

CE225 (R20)

B.TECH. DEGREE EXAMINATION, JULY-2023

Semester IV [Second Year] (Regular & Supplementary)

WASTE WATER ENGINEERING

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) What is meant by sewage?   CO1
   (b) What is the objective of using street inlets?   CO1
   (c) Write where is sewage pumping is required?   CO1
   (d) Write any two physical characteristics of sewage.   CO2
   (e) In BOD and COD which value is more for same given
       sample?   CO2
   (f) What is the use of grease traps?   CO2
   (g) Define sludge bulking.   CO3
   (h) Define COD.   CO3
   (i) What is meant by oxidation pond?   CO3
   (j) Write zones of pollution in running water body.   CO4
   (k) Write any two objectives of sewage disposal.   CO4
   (l) Mention any two characteristics of sewage sludge.   CO4
   (m) What is meant by anaerobic sludge digestion?   CO4
   (n) Write methods of sludge dewatering.   CO4

UNIT – I

2. (a) What are the various factors affecting quantity
       of storm water sewage? Explain in detail.   (7M)   CO1
   (b) Determine the size of circular sewer for a
       discharge of 600 l/s running half full. Assume
       i = 0.0001 and n = 0.015.   (7M)   CO1

(OR)

3. (a) Explain various types of sewers in detail. (7M) CO1
   (b) Explain about man holes in detail with neat sketch. (7M) CO1

UNIT – II

4. (a) Explain cycles of decomposition with neat sketches. (7M) CO2
   (b) Determine 1-day BOD and its ultimate BOD whose 5-day BOD @ 20^0C is 250 mg/l. Assume $K = 0.20$/day. (7M) CO2

(OR)

5. (a) What are the various methods of septic tank effluent disposals? Explain in detail. (7M) CO2
   (b) Write about working of skimming tanks with neat sketch. (7M) CO2

UNIT – III

6. (a) Differentiate between activated sludge process and trickling filters. (7M) CO3
   (b) Design low rate trickling filter for secondary treatment of sewage generated from 10000 persons with rate of water supply 200 LPCD. The BOD_5 after primary treatment is 120 mg/L and BOD_5 of final effluent should be 30 mg/L. Consider $C = 5.358$. (7M) CO3

(OR)

7. (a) Explain working of oxidation ponds with neat sketch. (7M) CO3
   (b) What is secondary settling tank? Explain how it is different from primary settling tank. (7M) CO3

UNIT – IV

8. (a) Explain various factors affecting self-purification of running water bodies in dilution. (7M) CO4
   (b) What are the various plumbing systems of drainage? Explain in detail. (7M) CO4

(OR)

9. (a) What are the various factors affecting sludge digestion? Explain in detail. (7M) CO4
   (b) Explain types of traps with neat sketches. (7M) CO4

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CE225 (R20)

B.TECH. DEGREE EXAMINATION, NOVEMBER-2023

Semester IV [Second Year] (Supplementary)

WASTE WATER ENGINEERING

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) What is meant by man holes?   CO1
   (b) Define sewage.   CO1
   (c) Write any two types of sewers.   CO1
   (d) What is meant by decomposition of sewage?   CO2
   (e) Write any two objectives of grit chambers.   CO2
   (f) What is meant by B.O.D?   CO2
   (g) Write merits of trickling filters.   CO3
   (h) Write any two operational problems of trickling
       filters.   CO3
   (i) What is meant by sludge bulking?   CO3
   (j) Define sewage sickness.   CO4
   (k) What is meant by trap?   CO4
   (l) What are the characteristics of sewage sludge?   CO4
   (m) Write any two merits of one pipe systems.   CO4
   (n) Write any two demerits of two pipe systems.   CO4

UNIT – I

2. (a) What are the various factors affecting sanitary
       sewage quantity? Explain in detail.   (7M) CO1
   (b) Design a sewer to a city which have 2 lakh
       population and the daily per capita water supply
       is 135 lpcd. The slope available for the sewer to
       be laid is 1 in 500 and the sewer should be
       designed to carry 3 times the dry weather flow
       when it is running half.   (7M) CO1

(OR)

3. (a) Write about various types of pumps in detail. (7M) CO1
   (b) List out various types of sewer appurtenances. Explain about street inlets and catch basins. (7M) CO1

UNIT – II

4. (a) Write about various chemical characteristics of sewage in detail. (7M) CO2
   (b) Explain in detail about (7M) CO2
       (i) Grease traps
       (ii) Skimming tanks.

(OR)

5. (a) Explain about septic tank with neat sketch. (7M) CO2
   (b) Calculate 8 day B.O.D at 30°C, if 5 day B.O.D at 20°C is 200 and deoxygenation constant at 20°C is 0.1 per day. (7M) CO2

UNIT – III

6. (a) Differentiate between trickling filters and activated sludge process. (7M) CO3
   (b) Design an Oxidation Pond for treating sewage from a colony of 20,000 persons with sewage flow rate of 250 lpcd. The BOD of applied sewage may be taken as 350 mg/l and effluent BOD is 35 mg/l. Assume hydraulic loading as 300 kg/day/ha and any other required data. (7M) CO3

(OR)

7. (a) What are the various types of aerators? Explain in detail. (7M) CO3
   (b) Explain construction and working principle of Activated Sludge Process with neat sketch. (7M) CO3

UNIT – IV

8. (a) Explain in detail about sewage disposal by Irrigation. (7M) CO4
   (b) Write about various methods of sludge disposal in detail. (7M) CO4

(OR)

9. (a) What are the various stages of sludge digestion? Explain in detail. (7M) CO4
   (b) Write about various types of sanitary fittings in detail. (7M) CO4

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CE225 (R20)

F-2

B.TECH. DEGREE EXAMINATION, MAY-2024

Semester IV [Second Year] (Regular & Supplementary)

WASTE WATER ENGINEERING

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) State the objectives of sewer appurtenances.   CO1
   (b) What is meant by drop man hole?   CO1
   (c) Write any two types of pumps.   CO1
   (d) Write any two types of sedimentation tanks.   CO2
   (e) Write any two physical characteristics of sewage.   CO2
   (f) What is the cause for COD is more than BOD?   CO2
   (g) State the working principle of activated sludge
       process.   CO3
   (h) Write any two operational problems of trickling
       filters.   CO3
   (i) What is meant by aeration?   CO3
   (j) Write objects of sewage disposal.   CO4
   (k) What is meant by house plumbing?   CO4
   (l) Write any two merits of single stack systems.   CO4
   (m) What is meant by sludge?   CO4
   (n) What is meant by sanitary fittings?   CO4

UNIT – I

2. (a) What are the various factors affecting storm
       water sewage quantity? Explain in detail.   (7M) CO1
   (b) Write about construction and working process
       of man hole with neat sketch.   (7M) CO1

(OR)

3. (a) Design a sewer to a city which have 1.5 lakh population and the daily per capita water supply is 200 lpcd. The slope available for the sewer to be laid is 1 in 500 and the sewer should be designed to carry 2 times the dry weather flow when it is running full. (7M) CO1

(b) Write about classification of sewerage systems in detail. (7M) CO1

UNIT – II

4. (a) Explain carbon and nitrogen cycles of decomposition with neat sketch. (7M) CO2

(b) Write about various methods of disposal of septic tank effluents in detail. (7M) CO2

(OR)

5. (a) Derive BOD equation to determine ultimate BOD of a sewage. (7M) CO2

(b) Calculate 10 day BOD at 25^0C, if 5 day BOD at 20^0C is 300 and deoxygenation constant at 20^0C is 0.1 per day. (7M) CO2

UNIT – III

6. (a) Write about construction and working principle of trickling filters with neat sketch. (7M) CO3

(b) Explain construction and working principle of oxidation pond with neat sketch. (7M) CO3

(OR)

7. (a) Explain in detail about (i) Sludge Volume Index (ii) Secondary Settling Tanks. (7M) CO3

(b) Design an oxidation pond for treating sewage from a colony of 10,000 persons with sewage flow rate of 200 lpcd. The BOD of applied sewage may be taken as 300 mg/l and effluent BOD is 30 mg/l. Assume hydraulic loading as 300 kg/day/ha and any other required data. (7M) CO3

UNIT – IV

8. (a) Explain in detail about sewage disposal by dilution. (7M) CO4

(b) Write about various characteristics of sewage sludge in detail. (7M) CO4

(OR)

9. (a) Write about classification of plumbing system of drainage in detail. (7M) CO4

(b) Explain various methods of sludge de-watering in detail. (7M) CO4

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CE225 (R20)

Hall Ticket Number:

CE225 (R20)

B.TECH. DEGREE EXAMINATION, SEPTEMBER-2024
Semester IV [Second Year] (Supplementary)
WASTE WATER ENGINEERING

Time: Three hours   Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)
Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:
   (a) What is sewerage system?   CO1
   (b) State the factors affecting the wet weather flow.   CO1
   (c) What is the purpose of catch basin in storm water
       system?   CO1
   (d) Differentiate fresh sewage and septic sewage.   CO2
   (e) Give the pH value of fresh sewage.   CO2
   (f) Define BOD.   CO2
   (g) What do you mean by attached growth system?   CO3
   (h) What is recirculation in high rate trickling filter?   CO3
   (i) Define MLSS.   CO3
   (j) State the reasons for sewage sickness.   CO3
   (k) What is sludge bulking?   CO4
   (l) What is sludge digestion?   CO4
   (m) What is the function of trap?   CO5
   (n) Mention the advantages of two pipe plumbing system.   CO5

UNIT – I

2. (a) Describe the systems of sewerage with relative
       advantages and disadvantages.   (7M) CO1
   (b) Determine the discharge for which sewer of a
       combined system with population of 30,000
       residing in a town having an area of 60 hectares
       is producing a sanitary sewage of 2880 cu.m per
       day. If the average coefficient of runoff for this
       area is 0.60, and the time of concentration is
       30 minutes. Make suitable assumptions.   (7M) CO1

(OR)

3. (a) Design an outfall sewer system for a town with a population of 1,50,000 persons with water supply of 180 liters per head per day. The sewer is to be brickwork rendered smooth with cement mortar (n = 0.012) and the permissible slope in 1 in 1000. A self-cleansing velocity of 0.75 meter per second is to be developed; the d.w.f may be taken as 1/3 rd of the maximum discharge. (7M) CO1

(b) Discuss the construction and testing of sewer line. (7M) CO1

UNIT – II

4. (a) Describe the nitrogen, carbon and sulphur cycles of decomposition of sewage. (7M) CO2

(b) The BOD_5 of a waste has been measured as 600 mg/l. If K_1 = 0.23/day, determine the ultimate BOD_u of the waste. What proportion of the BOD_u would remain unoxidised after 20 days? (7M) CO2

(OR)

5. (a) Design a septic tank for a small colony of 200 persons with daily sewage flow of 120 lpcd. (7M) CO2

(b) Design a grit chamber for a maximum wastewater flow of 10 MLD, to remove particles upto 0.2 mm diameter having specific gravity 2.65. The kinematic viscosity of water is $1.141 \times 10^{-6} \, m^2/s$ at 15°C. (7M) CO2

UNIT – III

6. (a) Explain the construction and working of a conventional trickling filter with sketch. (7M) CO3

(b) The sewage is flowing 4.5 million litres per day from a primary clarifier to a standard rate trickling filter. The 5 day BOD of the influent is 160 mg/l. The value of the adopted organic loading is to be 160 gm/m^3/day, and surface loading 2000 l/m^2/day. Determine the efficiency, volume of the filter and its depth. (7M) CO3

(OR)

7. (a) Design a conventional activated sludge plant to treat settled domestic sewage for the following data: (7M) CO3
   (i) Population = 10,000
   (ii) Sewage contribution = 160 lpcd
   (iii) settled sewage BOD_5 = 200 mg/l
   (iv) Effluent BOD_5 required = 20 mg/l

(b) Discuss the organic loading parameters of activated sludge process. (7M) CO3

UNIT – IV

8. (a) What are the objectives of sewage disposal? Explain in detail about any one sewage disposal method. (7M) CO4

(b) Describe the anaerobic sludge digestion process with neat sketch. (7M) CO4

(OR)

9. (a) Explain single stack system, one pipe and two pipe systems of hose plumbing with neat sketches. (7M) CO5

(b) Explain the principle of house drainage system. (7M) CO5

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CE225 (R20)