PVP 20

Code: 20CE4601D

III B.Tech - II Semester – Regular Examinations – JUNE 2023

SANITARY ENGINEERING
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

<table>
<tr><th></th><th></th><th></th><th>BL</th><th>CO</th><th>Max. Marks</th></tr>
<tr><td colspan="6">UNIT-I</td></tr>
<tr><td>1</td><td>a)</td><td>The catchment area is of 500 hectares. The surface cover in the catchment can be classified as given below:
Calculate the runoff coefficient and quantity of storm water runoff, if intensity of rainfall is 30 mm/h for rain with duration equal to time of concentration. If population density in the area is 500 persons per hectare and rate of water supply is 190 LPCD, calculate design discharge for separate system, partially separate system, and combined system.
<table>
<tr><td>Type of cover</td><td>Coefficient of runoff</td><td>Percentage</td></tr>
<tr><td>Roofs</td><td>0.90</td><td>13</td></tr>
<tr><td>Pavements and yards</td><td>0.80</td><td>18</td></tr>
</table>
</td><td>L3</td><td>CO1</td><td>7 M</td></tr>
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		Lawns and gardens	0.15	23			
		Roads	0.40	22			
		Open ground	0.10	10			
		Single family dwelling	0.50	15			
	b)	What are the factors should be considered for selecting the material of sewer?			L2	CO1	7 M
OR							
2	a)	Discuss the comparative merits and demerits of separate system and combined system.			L3	CO1	7 M
	b)	Compare the methods of collection of sanitation of conservancy & water carriage systems.			L3	CO1	7 M
UNIT-II							
3	a)	Explain various physio-chemical characteristics of sewage and their environmental significance.			L2	CO2	7 M
	b)	Explain about carbon, nitrogen cycle of decomposition of sewage.			L2	CO2	7 M
OR							
4	a)	Derive BOD equation.			L4	CO2	7 M
	b)	The BOD of sewage incubated for one day at 30^0C has been found to be 400 mg/l. Calculate the 5-day BOD at 20^0C. K=0.1 day^{-1}.			L4	CO2	7 M

UNIT-III					
5	a)	Explain briefly about trickling filter and its design criteria.	L2	CO3	7 M
	b)	The sewage is flowing at 45 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 $l/m^2/day$. The Circulation ratio (Q_r/Q) can be taken as 1.5. Determine the volume of the filter and its depth. Also calculate the efficiency of this filter unit.	L3	CO3	7 M
OR					
6	a)	Design a rectangular primary sedimentation tank for a wastewater treatment plant with Activated sludge process as secondary treatment to treat an average wastewater flow of 3 MLD. Assume any data if required.	L4	CO3	7 M
	b)	Discuss the design criteria for grit chamber.	L4	CO3	7 M
UNIT-IV					
7	a)	Design a septic tank for a population of 150 in a housing colony with daily sewage flow of 135 litres per capita per day. Assume the data if any required.	L4	CO4	7 M
	b)	Discuss briefly about the disposal of sewage in river water.	L2	CO4	7 M

OR					
8	a)	What is meant by sewage sickness and list out the preventive measure to control it?	L2	CO4	7 M
	b)	What are the environmental and health risks associated with sewage farming?	L2	CO4	7 M
UNIT-V					
9	a)	Explain in detail about sludge disposal.	L2	CO5	7 M
	b)	Explain in detail about sludge conditioning and dewatering with a neat sketch.	L2	CO5	7 M
OR					
10	a)	Design a sludge digestion tank for 40,000 people. The sludge content per capita per day is 0.068 kg. The moisture of the sludge is 94%. The specific gravity of the wet sludge is 1.02 and 3.5% of the digestor volume is daily filled with the fresh sludge, which is mixed with the digested sludge. Assume any data if required.	L4	CO5	7 M
	b)	Explain briefly about advantages and disadvantages of one pipe and two pipe system with neat sketches.	L2	CO5	7 M