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Question Paper Code: 1036106
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B.E. / B.Tech. DEGREE EXAMINATIONS, NOV / DEC 2024

Sixth Semester

Civil Engineering

U20CE601 – MUNICIPAL WASTE WATER ENGINEERING

(Regulation 2020)

Time: Three Hours

Maximum: 100 Marks

Answer ALL questions

PART – A

(10 x 2 = 20 Marks)

1. Name the sewage characteristics with which organic matter Concentration is expressed.
2. Distinguish between Self Cleaning velocity and Non-scouring velocity.
3. Define on-site sanitation. List the methods of onsite sanitation.
4. How will you classify screens based on size of clear openings?
5. Define sludge solids retention time in ASP design.
6. Compare the oxidation ditch with oxidation pond.
7. What is meant by disposal by dilution?
8. Under what condition, the effluent irrigation method for disposal of sewage can be favorably adopted?
9. Summarize the objectives of sludge thickening and its method.
10. Sketch the effect of temperature on the digestion period.

PART – B

(5 x 16 = 80 Marks)

11. (a) A city with a population of 100,000 has an area of 50km<sup>2</sup>. Rate of water supply is 110 litres per capita per day of which 80% turns into sewer. The average run-off coefficient is 0.5 and intensity of rainfall is 14.5mm/hr. Estimate the quantity of combined sewage. Take peak factor as 2.5. (16)

(OR)

- (b) (i) Explain the terms BOD and COD. Differentiate between first and second stage BOD. (8)  
(ii) The BOD of sewage incubated for one day at 30°C has been found to be 400 mg/l. Calculate the 5 day 20°C BOD. Assume  $K_{10} = 0.12/\text{day}$  at 20°C. (8)
12. (a) Describe the steps involved in the design of septic tank. And also explain the working of a septic tank with neat sketch. (16)

(OR)

- (b) Show the design a circular primary sedimentation tank to treat an average sewage flow of 5000 m<sup>3</sup>/day, suitably assuming the design criteria. Draw a neat sketch of the designed tank. (16)
13. (a) Summarize in detail with neat sketches about the trickling filters and state the various advantages and disadvantages of conventional trickling filter. (16)

(OR)

- (b) Discover how UASB is related with treatment of waste water? Write in detail about the UASB reactor with neat sketch, advantages and disadvantages. Explain its function and operation. (16)
14. (a) A city discharges 100 cumecs of sewage into a river, which is fully saturated with oxygen and flowing at the rate of 1500 cumecs during its lean days with a velocity of 0.1 m/s. The 5 days BOD of sewage at the given temperature is 280 mg/L. Find when and where the critical DO deficit will occur in the downstream portion of the river and what its amount is. Assume Coefficient of purification of the stream (f) as 4.0 and Coefficient of deoxygenating ( $K_D$ ) as 0.1. (16)

(OR)

- (b) Explain the principle of the self-purification process of river and the various stages of oxygen sag curve. (16)

15. (a) Design a sludge digestion tank with the following data.

1. Average flow of sewage = 60 MLD
2. Total Suspended Solids in raw sewage = 350 mg/L
3. Volatile Suspended solids = 250 mg/L
4. Moisture content of the digested sludge = 87%

Assume 65% of removal is done in primary setting tank and fresh sludge has water content of 95%.

(16)

(OR)

- (b) Design sludge drying beds to dewater the digested sludge produced from wastewater treatment plant based on Activated Sludge Process designed for 5000 population. Assume dry solid concentration and dry solid loading rate as 70 g/capita/day and 100 kg/m<sup>2</sup>/day. Take 7% solid content in digested sludge and specific gravity of digested sludge as 1.02. (16)

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