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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)
Sixth Semester, B.E. - Civil Engineering
Semester End Examination; May/ June - 2019
Waste Water Treatment

Time: 3 hrs   Max. Marks: 100

Note: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.
    ii) Assume Missing data, if any.

UNIT - I

1 a.	What do you mean by dry weather flow? Explain factors affecting it.	6
b.	Briefly discuss flow variation of sewage and its effect on design of sewer.	6
c.	Estimate the ratio of DWF and WWF and suggest suitable system of sewage for the following data : Area = 6000 hectors, Population density = 150 persons/ha, Impervious factor = 0.5, Rate of water supply = 200 lpcd of which 80% reaches sewer, Rainfall intensity = 40 mm/hr.	8
2 a.	Explain with sketch Time of concentration.	6
b.	Discuss the importance of self cleaning velocity and non-scorning velocity in design of sewer.	6
c.	A sewer of 300 mm in diameter laid at a gradient of 1 in 100. Using Mannings N = 0.013, calculate velocity of flow, discharge and Chezy's constant when sewer is running full.	8

UNIT - II

3 a.	List different sewer materials. Explain any two with merits and demerits.	6
b.	With a neat sketch, explain components of manhole.	8
c.	Explain the procedure of testing of sewer lines.	6
4 a.	Sketch typical layout plan showing house drainage connection.	8
b.	Bring out single plane and two pipe system of house drainage.	6
c.	Write the necessity of sewage pumping.	6

UNIT - III

5 a.	Define BOD and COD. Derive expression for first stage BOD.	8
b.	Sketch CNS cycle.	6
c.	The BOD of a sewage incubated for one day at 30°C is 100 mg/L. What will be the 5-day 20°C BOD? Take K = 0.12 day^{-1}(base 10) at 20°C.	6
6 a.	With a neat sketch of DO sag curve, explain self purification process of stream. Mark different Zones of pollution.	8
b.	Bring out in brief sewage forming, sewage sickness and preventive measures.	8
c.	Sewage from a town is discharged into a river having a flow of a 250 *L*/s. If the sewage flow of 10 MLD and BOD of the sewage and river are 300 mg/L and 10 mg/L respectively, determine the BOD of the diluted water.	4

UNIT - IV

7 a. With flow diagram, explain conventional sewage treatment plant units and state major impurities removed in each unit. 6

   b. Briefly explain design factors of grit chamber. 6

   c. Design a suitable circular primary classifier to treat 12 MLD sewage flow. Check for overflow rate and weir loading rate. 8

8 a. Compare attachment and suspended growth system of biological treatment. 6

   b. Bring out aerobic and anaerobic decomposition of sewage. 6

   c. Design a low rate tricking filter using NRC equation to treat 6 MLD of sewage having BOD of 210 mg/L. The treated effluent BOD should be 30 mg/L. Take organic loading rate as 320 g/m^3/d. Assume 30% BOD removed in PST. 8

UNIT - V

9 a. With flow diagram, explain the process of treatment of sewage in Activated Sludge Process (ASP). 8

   b. Bring out process modifications of ASP in brief. 6

   c. Explain the importance of F/M ratio in the operation of ASP as primary control parameter. 6

10 a. Explain the steps of anaerobic digestion. Sketch typical anaerobic sludge digester. 8

   b. Explain sludge drying bed wth suitable sketch. 6

   c. Design a septic tank for a hostel facility of 200 persones with water supply rate of 135 LPCD. Take peak factor = 2; 80% of water supplied becomes spent; Detention time 24 hours; Length to bredth 1:3. Assume suitabaly missing data. Draw a line diagram showing desinged dimensions. Rate of sludge deposited may be taken as 30 L/capita/day. 6

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