BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: BE   SEMESTER: VII
BRANCH: CIVIL   SESSION : MO/2019

SUBJECT : CE8009 SEWERAGE AND SEWAGE TREATMENT

TIME: 1.5 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

Q1	(a)	Discuss the data required for design of stormwater drainage system.	[2]
	(b)	Explain the following (a) minimum velocity concept to prevent formation of hydrogen sulfide in sewers, (b) potential for sulfide condition in sewers, (c) self-cleansing velocity	[3]
Q2		Design an unlined trapezoidal section for an outfall of an open urban storm water drain, for a catchment of 138 ha. Drain is designed based on 5 years rain frequency and rainfall for 48 min duration is 52 mm for 5-year frequency. Other given data: Inlet time = 18 minutes, flow time in upper reaches of drain = 30 minutes, runoff co-efficient = 0.6, S = 1 in 3000, maximum permissible flow velocity = 0.9 m/sec, N = 0.025, assume depth = 1.5 m, side slope as 1:1.	[5]
Q3		One-meter diameter pipe is buried in 1.6 m wide trench and backfilled with dry sand. Top of pipe is 3.0 m below the surface of fill. Pipe passes at right angles beneath a one lane road which carries vehicle whose loading consists of two concentrated 800 kg loads located at 2.0 m apart to the roadway. Find maximum vertical force exerted on a unit length of pipe made of steel and other made of CI. Ignore wall thickness of pipe for determining the external diameter. (Values of dry sand, when H/B is 1.0 = 0.84 and when H/B is 2.0 = 1.45)	[5]
Q4	(a)	What is a positive projecting conduit and negative projecting conduit?	[2]
	(b)	Describe the forces acting on sewer pipes.	[3]
Q5	(a)	If L_o of a sample is 200 mg/L and k' is 0.25 day^{-1}. Determine how much BOD is exerted and how much BOD remains after 3 days, 5 days and 7 days?	[2]
	(b)	Explain the methods to quantify bacteria in wastewater.	[3]
Q6	(a)	What are the important chemical characteristics of sewage?	[2]
	(b)	Describe the following: DO, BOD, NBOD, COD, ThOD and TOC	[3]

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