

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: BTECH
BRANCH: CIVIL

SEMESTER : V
SESSION : MO/2022

SUBJECT: CE304 ENVIRONEMNTAL ENGINEERING

TIME: 3:00 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q.1(a) Discuss the significance of setting up standards for drinking water.	[2]	1	2
Q.1(b) Explain the speciation of components of alkalinity with pH.	[3]	1	2
Q.1(c) A 2 m diameter well is being pumped at a constant rate of 0.85m ³ /min producing drawdowns of 0.8 & 0.5 m in two test bores 30 & 60 m away respectively from the well. Depth of water before pumping was 15 m. find the radius of zone of influence.	[5]	1	3
Q.2(a) Discuss the theory of sedimentation.	[2]	2	1
Q.2(b) Distinguish the difference between type 2 settling from type 1.	[3]	2	2
Q.2(c) Two million liters of water per day is passing through a sedimentation tank which is 6 m wide, 15 m long and having a water depth of 3 m. (a) find the detention time for the tank. (b) what is the average flow velocity through the tank? (c) if 60 ppm is the concentration of suspended solids present in turbid raw water, how much dry solids will be deposited per day in the tank, assuming 70% removal in the basin, and average specific gravity of the deposit as 2. (d) compute the overflow rate.	[5]	2	3
Q.3(a) Enlist important criteria for selection of pressure pipes.	[2]	3	1
Q.3(b) discuss the role of internal pressure in pressure conduits.	[3]	3	2
Q.3(c) Estimate roughly the sizes of supply conduits leading to an adequate serviced reservoir, serving a city with industrial establishments having a population of 5 lakh people. Also find the hydraulic gradient at which the pipelines are proposed to be laid. Assume suitable data, where required.	[5]	3	3
Q.4(a) Enlist important design criteria for sewerage systems.	[2]	4	1
Q.4(b) Discuss the importance of time of concentration in sewerage network analysis.	[3]	4	2
Q.4(c) A sewer line is laid to serve a community of 150 persons/ha in a Mohalla of 30 ha. the average water supply is 225 l/c/d. The available ground slope is 1 in 600. Using Manning's formula with n = 0.015, select a suitable diameter of sewer to carry the peak discharge, flowing half full in the section. [d/D = 0.5; a/A = 0.5; p/P = 0.5; r/R=1; v/V=1; q/Q 0= 0.5.]	[5]	4	3
Q.5(a) Explain the following terms with reference to activated sludge process (ASP) (i) pseudo kinetic parameters; (ii) MLSS & MLVSS.	[2]	5	2
Q.5(b) Draw and Explain conventional ASP model.	[3]	5	2
Q.5(c) the following ASP data is given: (a) influent BOD ₅ is 250 mg/l; (b) the effluent BOD ₅ should meet exact Indian norms; (c) flow rate is 10 MLD; (d) return sludge concentration is 9000 mg/l as vss; (e) suspended solids in mixed liquor is 3000 mg/l as vss & suspended solids in effluent is 10 mg/l as vss; (f) MCRT is 12 days; (g) kinetic coefficient, Y is 0.6 mg cells/mg BOD ₅ utilized & k _d is 0.065/d. Estimate (i) volume of the reactor; (ii) recirculation ratio; (iii) wasting rate from the reactor; (iv) VLR. Assume suitable data/condition if not given.	[5]	5	3

:::24/11/2022:::M