CLASS: M. Tech   SEMESTER : II
BRANCH: ENVIRONMENTAL SC & ENGG.   SESSION : SP/19

SUBJECT: CE532 WASTE WATER ENGINEERING

TIME: 3 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.

Q.1(a)   Design a discharge for separate, combined and partially separate system for a catchment area of   [5]
300 hectare, with population density of 350persons/ha and rate of water supply as 200LPCD. The
catchment characteristics are given below:

Type of Cover	Runoff Coeff	%	Type of Cover	Runoff Coeff	%
Roof	0.9	15	Pavements	0.8	15
Lawns	0.15	25	Roads	0.4	20
Open ground	0.10	15	Single family	0.5	10

Q.1(b)   i. Compare the advantages and disadvantages of Conservancy system and Water Carriage System.   [3]
ii. Compare rational and empirical methods of runoff estimation   [2]

Q.2(a)   Assuming that 80% of water supplied to a city is converted to sewage, design a rectangular primary   [5]
sedimentation tank for a town with population of 50000 and water supply of 180LPCD. Assume
the detention period of 2hrs with an average overflow rate of $30m^3/d/m^2$.4m is required as the
inlet and outlet arrangements.

Q.2(b)   Explain the significance of activated sludge process.   [5]

Q.3(a)   Compare the traditional and modern types of sequencing batch reactors.   [5]
Q.3(b)   A wastewater contains nitrogen, explain and justify the process and unit operation associated   [5]
with nitrogen removal.

Q.4(a)   An activated sludge plant has to be designed. What are the important consideration while planning   [5]
and designing it,
Q.4(b)   Compare Activated Sludge and Trickling filter process.   [5]

Q.5(a)   For a 100000 inhabitants wastewater treatment plant composed by an UASB reactor, estimate the   [5]
amount of sludge in each stage of its processing. The percapita sludge mass production is
15gSS/inhabitant.d, volumetric production is 0.4L/inhabitant.d. Only dewatering is to be
performed through Sludge beds. Assume sludge mass production of 0.15kg/SS/Kg applied COD,
percapita COD production of 0.1kgCOD/inhabitant.day, per capita mass production of dewatered
sludge as 15gSS/inhabitant.d. The percapita volumetric production is reduced to
0.04L/inhabitant.d

Q.5(b)   i. Signify the importance of Volume-mass relationship while handling sludge.   [3]
ii. What are the indicators of high performing digestors?   [2]

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