20/12

December 2023

B. Tech. (Civil) B.Tech. V SEMESTER

Waste Water Engineering (PCC-CED-306)

Time: 3 Hours   Max. Marks:75

Instructions: 1.   It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.
2.   Answer any four questions from Part -B in detail.
3.   Different sub-parts of a question are to be attempted adjacent to each other.
4.   ~~For release specific instructions~~

PART -A

Q1	(a)	What is the necessity of treating wastewater?
	(b)	Define dry and wet weather flow.
	(c)	What do you mean by self-purification of natural water bodies? What are the factors affecting the self-purification.
	(d)	Differentiate between domestic wastewater and industrial wastewater
	(e)	What is the purpose of equalization?
	(f)	List down the types of Aeration systems.
	(g)	What is objective of adding Alum to water before filtration?
	(h)	What is coagulation-flocculation process?
	(i)	Define the following terms: (i) Sludge volume index, (ii) Mean cell residence time and (iii) Mixed liquor suspended solids
	(j)	State the advantages of UASB reactor.

(a) (1.5)
(b) (1.5)
(c) (1.5)
(d) (1.5)
(e) (1.5)
(f) (1.5)
(g) (1.5)
(h) (1.5)
(i) (1.5)
(j) (1.5)

PART -B

Q2 (a) Explain the following terms: 1) Detention time 2) Surface Loading Rate 3) Weir   (5)
Loading Rate

(b) (i) Explain the concept of BOD and COD. (ii) Differentiate between first and second   (10)
stage BOD.
(iii)The 5 day BOD at 30°C of a sewage sample is 120mg/L. Calculate 5 day BOD at
20°C. Assume deoxygenation constant at 20oC, K = 0.1/day.

Q3 (a) A water treatment plant has a flow rate of 0.6 m³/sec. The settling basin at the plant   (5)
has an effective settling volume that is 20 m long, 3 m tall and 6 m wide. Will particles
that have a settling velocity of 0.004 m/sec be completely removed? If not, what
percent of the particles will be removed?

(b) Explain the operational problems often encountered by attached growth treatment   (10)
units.

Q4   Discuss the functioning of a rapid sand filter, with the help of a neat sketch. Distinguish   (15)
between slow sand and rapid sand filters.

Q5 (a) Discuss the working principle of stabilization pond with the diagram.   (5)

(b) Explain the working mechanism of Rotating Biological Contractor with neat sketch.   (10)

Q6 (a) With a flow diagram, describe the mechanism of Activated Sludge Process (ASP) and   (10)
loading criteria of aeration tank. What is the advantage of recycling of sludge in this
process.

(b) Write principal and stages of anaerobic digestion also explain its factor affecting.   (5)

Q7   Draw the process flow chart of waste treatment units in (i) pulp & paper industry and   (15)
(ii) tannery. Discuss the characteristics of effluent from these plants.