Prof. Veeresh Gali

COURSE CODE: 14M31CE215   MAX. MARKS: 25

COURSE NAME: SURFACE WATER QUALITY MANAGEMENT

COURSE CREDITS: 03   MAX. TIME: 1.5 Hr

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

Q1.a) What are the principal physical characteristics of rivers that are of interest in water quality management? Mention the significant chemical and biological characteristics of water that need to be considered in stream water quality monitoring?   **[03 Marks]**

b) A river between km.120 and km.105 is to be characterized as a constant flow-constant area reach. Assume the following cross-sectional areas (A) were measured for the given flows: **[03 Marks]**

Q, m^3/s	15.0	21.0	37.0	62.0	96.0
A, m^2	63.0	88.0	102.0	149.0	204.0
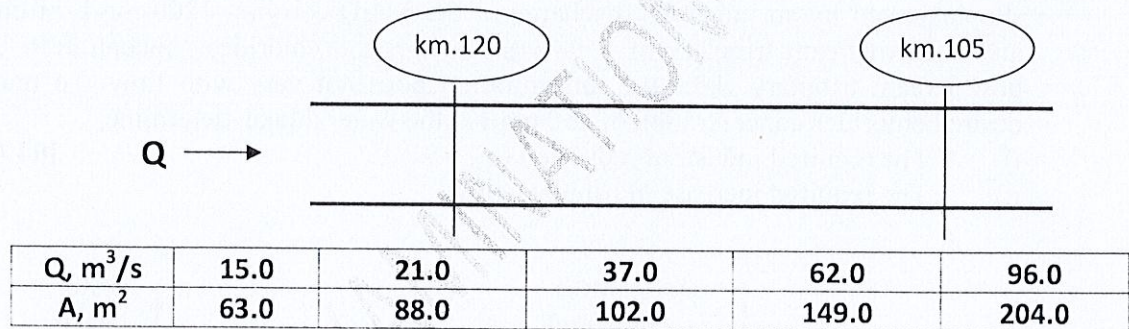
Estimate the travel time through the reach for flows of 17.0m^3/s and 85m^3/s

Q2.a) With the help of neat sketches, describe the mixing phenomenon for a i) typical onshore discharge of wastes into streams and ii) discharge from ports along the length of the pipe across the river   **[03 Marks]**

b) For the clean, straight natural stream, estimate the flow and approximate the distance to complete mixing for the side-bank discharge   **[02 Marks]**
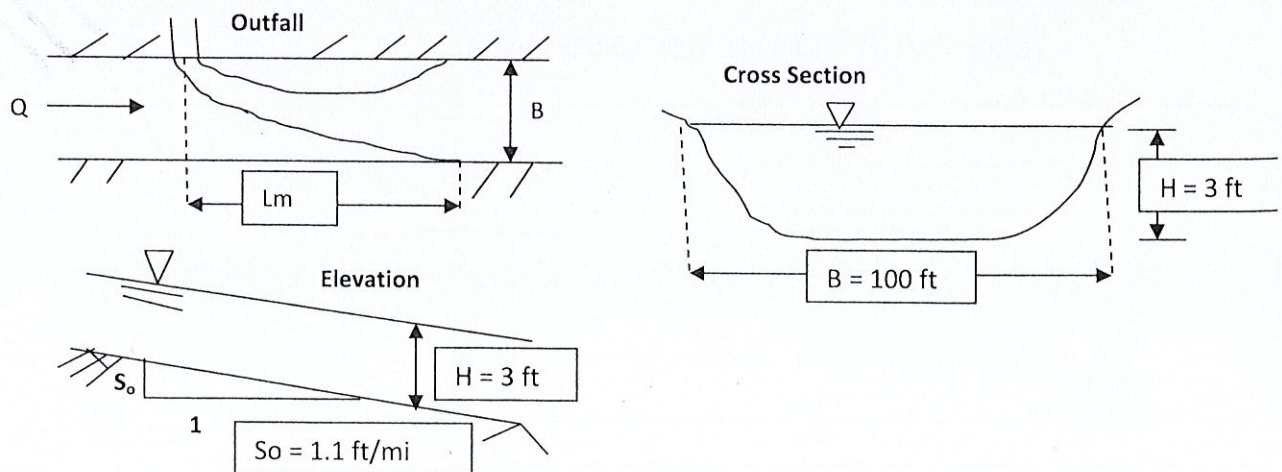
Q3.a) What are the principal inputs which affect the Dissolved Oxygen in Streams? What are the different processes which replenish the DO in streams? **[02 Marks]**

b) The following CBOD data were obtained in a tributary together with corresponding daily average flows: **[04 Marks]**

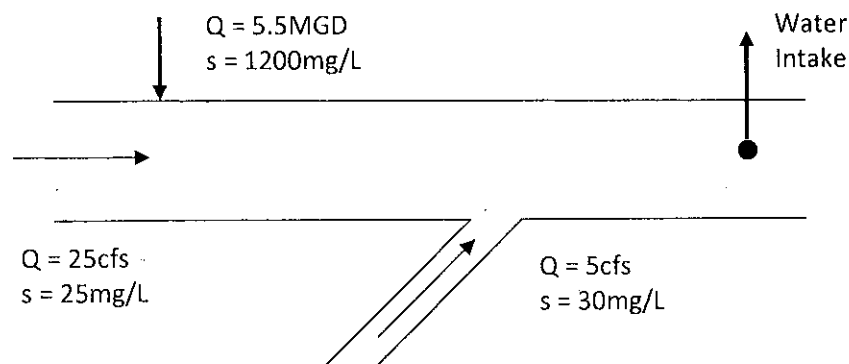| Q (cfs)	20	40	70	100	300	440	1000
CBOD (mg/L)	2.1	5.7	5.7	8.0	13.4	26.7	28.6

Estimate the mean CBOD loading in the tributary (avg.W) during a 10-day period when daily flows were 300, 280, 600, 400, 500, 800, 620, 360, 200 and 80cfs.

Q4.a) What are the effects of land use on River flow? **[02 Marks]**

b) Distinguish between a "Conservative" and a "Non-conservative" Pollutant. **[02 Marks]**

c) A river with a background level of chlorides (conservative substance) of 25 mg/L is supplemented by an industrial discharge of 5.5 MGD carrying 1200 mg/L of chlorides, and a downstream tributary of 5cfs with background chlorides concentration. Assume downstream tributary chlorides concentration does not vary with flow. To maintain a desired chlorides concentration of 250 mg/l at the water intake, determine:

i) The required industrial reduction or **[04 Marks]**

ii) The required increase in tributary flow

(Note: 1 MGD = 1.86 cfs; 1cfs = 0.0283 m³/s)