

KATHMANDU UNIVERSITY
Subject Code: ENVE 101 FM:20 Time 1 hr
First Internal Examination
SET A

[5]

1. Define the following terms in a sentence.

- a) Design Period
- b) Black water
- c) Runoff
- d) HRT
- e) Heterotroph

2. The population statistics of a town are given below. Estimate the population expected in the year 2020 by geometrical and arithmetical methods.

[5]

Year	1960	1970	1980	1990	2000	2020
Population	80,000	1,50,000	2,00,000	2,50,000	3,10,000	?

Using the population from the geometric method, determine (c) the total discharge in m^3/s of the city if the per capita demand is 110 lpd.

3. A well-mixed sewage lagoon (a shallow pond) is receiving $430 m^3/d$ of untreated sewage. The lagoon has a surface area of 20 ha (hectares) and a depth of 2.0 m. The pollutant concentration in the raw sewage discharging into the lagoon is 180 mg/L. The organic matter in the sewage degrades biologically (decays) in the lagoon according to first-order kinetics. The reaction rate constant is $0.70 d^{-1}$. Assuming no other water losses or gains (evaporation, seepage, or rainfall) and that the lagoon is completely mixed, find the steady-state concentration of the pollutant in the lagoon effluent.

[5]

4. Short notes

- a) Eutrophication
- b) Components of sewer

[2.5*2=5]