COURSE CODE: 10B11CE613   MAX. MARKS: 15
COURSE NAME: Sewage Treatment and Disposal
COURSE CREDIT: 4   MAX. TIME: 1 HR

Note: Attempt all Questions. Carrying of mobile phones during exams will be treated as case of unfair means. Assume suitable data if required.

1. Determine the design discharge for a combined sewer system serving a population of 120,000 with a wastewater generation rate of 125 lpcd. The catchment area is 150 hectares and the average run off coefficient is 0.75. The time of duration of design rainfall is 60 minutes. **(3)**

2. With a neat working sketch, explain the functioning of the vacuum sanitary sewer system **(3)**

3. With a neat sketch, explain the suitability of interceptor type of collection system **(3)**

4. In the context of population forecasting, '*The logistic curve method utilizes other population forecasting methods for predicting the population*'. Justify the statement with a neat sketch. **(3)**

5. A lateral is to be designed for a city of 80km². It will cover 45% residential, 35% commercial and 20% Industrial areas. The residential area is designed for 30% large lots, 35% small single family lots, 25% small two family lots and 10% for multistoried apartments. The average domestic wastewater flow rate is 9.5×10^{-6} m³/sec/person, commercial flow rate 3.2×10^{-4} m³/sec/ha and the industrial flow rate is 4.75×10^{-4} m³/sec/ha. Infiltration and Inflow occurs for about 80% of the area and has a flow rate of 1500 l/d/ha. Calculate the maximum and the minimum flows required to be maintained in the sewer. The saturation densities for the residential areas are given in the following table **(3)**.

Type of area	Density (persons/ha)
Large lots	9
Small lots, single family	80
Small lots, two family	130
Multistoried apartments	2700