

# GATE.CH.61

EE23BTECH11062 - V MANAS

## Question:

The outlet concentration  $C_A$  of a plug flow reactor (PFR) is controlled by manipulating the inlet concentration  $C_{A0}$ . The following transfer function describes the dynamics of this PFR.

$$\frac{C_A(s)}{C_{A0}(s)} = e^{-(\frac{V}{F})(k+s)}$$

In the above question,  $V=1m^3$ ,  $F=0.1m^3min^{-1}$  and  $k=0.5min^{-1}$ . The measurement and valve transfer functions are both equal to 1. The ultimate gain, defined as the proportional controller gain that produces sustained oscillations, for this system is (GATE 2023 CH 61)

## Solution: