EXECUTIVE SUMMARY

Problem C – Team 1 – Sri Venkateswara College, Delhi University

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Here we develop some implicit behavioral assumptions in student interactions. This enables us to form differential equations governing the transition of socialization among students. We build this in the following model.

We human beings cannot live without interaction so we all interact with each other according to our habits, nature. We have divided the students among 2 groups:

- Students having similar attributes -H(t)
- Students having similar interest of studying -A(t)

So, considering the situation of group 1

Let entry rate of group 1 be- a1

Let leaving rate be-b1

So, the equation would be:

\[
dH/dt = a1*H(t) - b1*H(t)
\]

Initial situation of group 2:

There are 2 types of people entering in the group:

a) People having good academic performance
b) People having bad academic performance but interested in studies.

Let entry rate of good performing people be: c2
Let rate of leaving be: b2

Differential equation of above group is:

\[
dA/dt = c1*A(t) + c2*A(t) - b2*A(t)
\]
\[ \frac{dA}{dt} = (c_1+c_2) \cdot A(t) - b_2 \cdot A(t) \quad \text{[Let } c_1 + c_2 = a_2 \text{]} \]
\[ \frac{dA}{dt} = a_2 \cdot A(t) - b_2 \cdot A(t) \]

Now the group 1 and group 2 people would also interact with each other.
Let the interaction rate of group 2 people with group 1 be: \( a_1 \)
Let the interaction rate of group 1 people with group 2 be: \( b_1 \)

**So, the new equations after the interaction of both groups**

**For group 1:**
\[ \frac{dH}{dt} = a_1 \cdot H(t) + b_1 \cdot H(t) + a'_1 \cdot A(t) - b'_1 \cdot H(t) \]
\[ \frac{dH}{dt} = (a_1 - b_1 + b'_1) \cdot H(t) + a'_1 \cdot A(t) \]
let \( a_1 - b_1 - b'_1 = k_1 \)
\[ \frac{dH}{dt} = k_1 \cdot H(t) + a_1 \cdot A(t) \]

**For group 2:**
\[ \frac{dA}{dt} = a_2 \cdot A(t) - b_2 \cdot A(t) + b'_1 \cdot H(t) - a'_1 \cdot A(t) \]
\[ \frac{dA}{dt} = (a_2 - b_2 - a'_1) \cdot A(t) + b'_1 \cdot H(t) \]
Let \( a_2 - b_2 - a'_1 = k_2 \)
Then, \( \frac{dA}{dt} = k_2 \cdot A(t) + b'_1 \cdot H(t) \)

Here we have taken only 2 groups but there could be many other interactions too to describe human interactions through various differential equations.

**Incorporating additional issue**
As we can see in general scenario that in colleges there are various students union parties who help in the management of college. So students including both kinds i.e. academics and non-academics get influenced from these parties and also joins them in order to gain, name, fame and to help others.