# Midsemester Examination

## Biogechemical Cycles and Surface Processes

## ES 2101

1. Suppose landfills leak 1ppb of methane into the atmosphere each year.
   a. What is the resultant radiative forcing 20 years from now? ($k_2 = 0.031$, current methane concentration is 700 ppb)
   b. What is the equivalent carbon dioxide concentration? (current carbon dioxide concentration is 400 ppm).
   c. Suppose a soil vapour extraction system is installed at the landfills to suck up the methane before it leaks into the atmosphere. If that methane is burned, what would be the resultant carbon dioxide emission into the atmosphere?
   d. What is the equivalent carbon dioxide savings by burning methane instead of allowing it to leak? (3+3+3+3)

   Explain all steps carefully.

2. Draw a sketch of the variation of (a) annual layer thickness and (b) bulk density with depth in an ice core. Also draw the variation of (a) age of ice and (b) age of gas with depth in the ice core. (8)