# Major Examination – ASL410 – 2016
## Allotted Time: 2.5 hours

The questions are divided into two sections: Practical and Theory. All the sections are compulsory.

### Section 1: Practical
### (20 Marks; 30 minutes)

**Q.1.** What is the name of the IIT Delhi HPC system on which the practical was carried out? **(1)**
**Q.2.** Which model was installed? Describe in details the major steps that were followed. **(6)**
**Q.3.** What is the utility of Makefile? **(2)**
**Q.4.** What is the utility of a namelist? **(2)**
**Q.5.** Say, you want to change a parameter and do a sensitivity run. How do you proceed? **(3)**
**Q.6.** What does "PBS" stand for? What is its function? **(2)**
**Q.7.** What do you mean by model validation? What are the various ways of improving a climate model once the validation is done? **(3)**
**Q.8.** What is the highest frequency at which one can get model outputs? **(1)**

### Section 2: Theory
### (30 Marks; 2 hours)

**Q1.** Which out of: downdraft fraction, deep convective adjustment time, and entrainment parameter, is the most sensitive? **(1)**
**Q2.** What is the full name of this course? **(1)**
**Q3.** What do you mean by a 'feasible" range of a parameter? **(2)**
**Q4.** What is the difference between concentration pathways and emission pathways in the context of CMIP/IPCC? **(3)**
**Q5.** Answer any three questions **(6 marks)**
- **(a)** Write and explain the updraft mass flux equation. **(2)**
- **(b)** What do you mean by a process-oriented-diagnostic? **(2)**
- **(c)** What do you mean by climate change signal in a given variable (e.g., rainfall)? **(2)**
- **(d)** How do we find out the uncertainty in climate change signal of rainfall due to parameter sensitivity? **(2)**

**Q6.** Answer any three questions **(9 marks)**
- **(a)** Explain the method of Quantile-based Bias Correction (QBC). **(3)**
- **(b)** How is bias correction different than model tuning? Explain. **(3)**
- **(c)** Differentiate between statistical and dynamical downscaling. **(3)**
- **(d)** Define CAPE with equation. Which term in the equation gets affected because of entrainment? **(3)**
- **(e)** Do you expect a cloud to be deeper or shallower if it entrains more? Explain using the CAPE equation. **(3)**
- **(f)** What do you mean by Geo-engineering? Why is it done? How is it done in the model? **(3)**

**Q7.** Answer any two questions **(8 marks)**
- **(a)** Explain figure 1. **(4)**
- **(b)** Explain the hatching and stippling in figure 2. **(4)**

What are the conserved variables used in the one dimensional (1D) entraining plume model? Write down the conservation equation. **(4)**

**Figure 1**

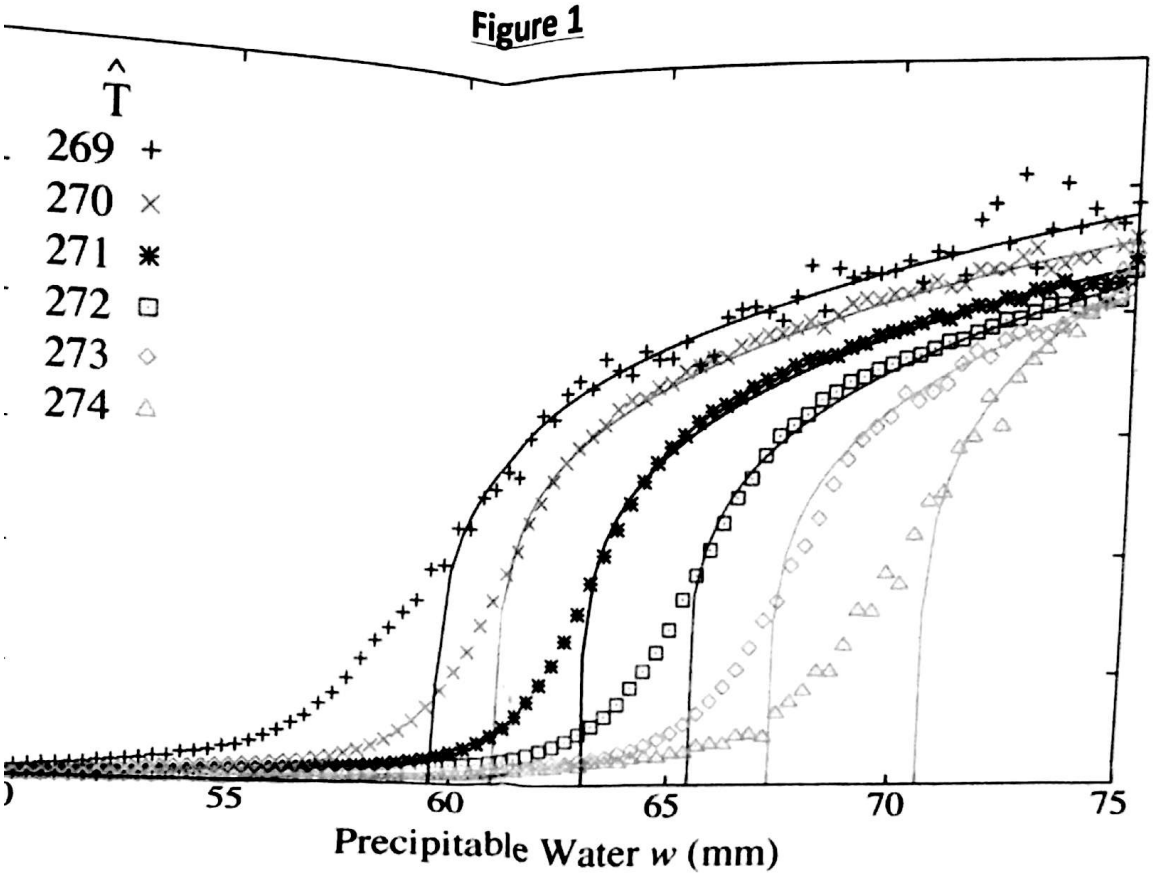


**Figure 2**