School of Environment & Natural Resources (SENR)
Mid-Semester 2017
M.Tech. IInd Sem
ETC - 597 : Environmental System Analysis and Modelling

Max Marks : 30   **Time : 2 hours**

Section A : Answer any FIVE of the followings.   (2 Marks each)

1. Describe different conditions of atmospheric stability. Explain mixing height and ventilation coefficient.
2. What is plume rise? How can it be estimated?
3. What is the difference between Lagrangian and Eulerian frame of reference? Describe their applications with examples.
4. Explain Line and Area source dispersion model.
5. How does the Low pressure system and High pressure system affect Boundary layer height? Explain.
6. How does the pressure vary with altitude? Explain and obtain the hypsometric equation.
7. What is potential temperature? How does it relate to atmospheric stability?

Section B : Answer any FOUR of the following: (5 Marks each)

8. Explain with a neat diagram what the point-source Gaussian Plume model is. What is the significance of Gaussian dispersion coefficients σ_y and σ_z?

9. What is boundary layer height? How is the boundary layer formed? Explain different layers of boundary layer. Which are the dominant forces in boundary layer worth to be considered?

10. What is equation of state for an ideal gas? How does it get modified in the presence of water vapour? Explain virtual temperature in this context.

11. Which are the fundamental forces governing the dynamics of the atmosphere? Derive an expression for the pressure gradient force.

12. What is continuity equation of air? Show that continuity equation is given by
$$\frac{\partial N}{\partial t} + \nabla \cdot (vN) = 0$$
where N is the no. concentration of gas molecules. Other symbols have their usual meaning.

13. Discuss the aerosol transport and effect over Himalayan region.

14. Describe any one air quality model based on either Lagrangian frame of reference or Eulerian frame of reference.