AIR POLLUTION
SELF-ASSESSMENT TEST
LESSON 3

Answers

1. **False**
   If the temperature varies linearly with height between 296 K (ground) and 289 K (420 m), this layer of the atmosphere is subadiabatic as the lapse rate of the environment is not as steep as the dry adiabatic lapse rate (9.76 $K \cdot km^{-1}$).

2. **True**
   Exhaust gases leaving the top of stacks rise higher than the stack top when their density is lower than the density of the surrounding air.

3. **False**
   Mechanical turbulence is caused by physical obstructions such as hills, mountains or buildings, whereas convective turbulence results from different heating-cooling of surfaces and air masses.

4. **True**
   In stable atmospheres pollutants do not rise and sink vertically; they fan out horizontally. The pollutant plumes can extend downwind from the source for a long distance without spreading or diluting, therefore, high concentrations can be found far from emission sources.

5. **False**
   Troposphere extends from the surface to between 10-11 kilometers. Atmospheric Boundary Layer (ABL) is the bottom layer of the troposphere. Its thickness is quite variable in time and space.

6. **True**
   Unstable conditions mostly develop on sunny days with low wind speeds where strong insolation is present. In contrast, stable conditions occur at night when there is little or no wind.

7. **False**

Wind tunnel experiments are very useful tools to assess specific small-scale air pollution problems. They are used to estimate the location where a contaminant would be expected to move under controlled conditions when local buildings or terrain have significant influences; for example, to analyze the fate of the emissions released by traffic in a street.

8. **False**

The disadvantage in using models based on statistical treatment of historical records is that require long and high-quality meteorological and air quality databases.

9. **False**

Box models describe the change with time in the abundance of air pollutants inside a box representing a selected atmospheric domain by mass balance.

10. **True**

The Gaussian plume model is a diffusion model. It is the most common air pollution model for estimating concentrations from point sources downwind assuming that pollutant concentrations are proportional to the emission rate, that they are diluted by the wind at a rate inversely proportional to the wind speed and that they do not undergo chemical reactions or other removal processes.