School of Environment & Natural Resources (SENR)
Mid-Semester 2015 (Monsoon Semester)
M.Sc. IIst Sem
EES-520: Atmosphere, Weather & Climate

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

Section A : Answer not more than 20 words (1 Marks each)

1. What is potential temperature?
2. What is the difference between barotropic and baroclinic atmosphere?
3. What are the forces that balance a geostrophic wind?
4. What is synoptic scale motion?
5. What is the difference between universal gas constant and specific gas constant?

Section B : Answer any FIVE of the following   (2 Marks each)

6. Airline passengers flying at high latitudes are exposed to higher ozone concentrations than those flying in the tropics. Explain.
7. Airliners traveling between Tokyo and Los Angeles often follow a great circle route westbound and a latitude circle eastbound. Explain.
8. If a layer of the atmosphere is well mixed in the vertical, how would you expect the potential temperature within it to change with height?
9. Compare the temperature and moisture characteristics of the following air masses : cA, cP, mP, mT and cT.
10. Describe different types of fog formation.
11. What is the difference between coriolis force and centrifugal force? Explain.
12. Which one among polar jet stream and subtropical jet stream is faster and why?
13. What is hydrostatic approximation? Derive an expression for the pressure variation with altitude.

Section C : Answer any THREE of the following   (5 Marks each)

14. What is dry adiabatic lapse rate? Derive an expression for dry adiabatic lapse rate and show that it is 9.76°C/km. ($g = 9.8\ ms^{-2}, C_p = 1006\ Jkg^{-1}degC^{-1}$)
15. What are weather fronts? How and where are they formed? Describe different types of weather fronts.
16. What is cloud? How are the clouds classified? Describe different types of clouds.
17. Describe the three cell model of global circulation of winds and the factors responsible for three cell structure. Explain the movement of surface winds while describing the causes of high pressure belts and low pressure belts formation.
18. Explain the formation and the characteristics of mid-latitude cyclone and anti-cyclone.
19. What is continuity equation? Show that continuity equation is given by
$$\frac{\partial N}{\partial t} + \nabla.(vN) = 0$$
where N is the no. concentration of gas molecules. Other symbols have their usual meaning.
20. Derive an expression for coriolis force when an air parcel is moved along meridian, i.e., when latitudinal displacement takes place.