Topic: General Circulation of the Atmosphere [Geography Notes for UPSC]

The pattern of the movement of the planetary winds is called general circulation of the atmosphere.

Factors for General Circulation of the Atmosphere

- The pattern of planetary winds largely depends on:
  - Latitudinal variation of atmospheric heating
  - The emergence of pressure belts
  - The migration of belts following the apparent path of the sun
  - The distribution of continents and oceans
  - The rotation of the earth
- The general circulation of the atmosphere also sets in motion the marine water circulation which affects the climate of the Earth.
- The air at the ITCZ (Inter Tropical Convergence Zone) upsurges because of convection caused by high insolation and low pressure is generated.
- The winds from the tropics join at this low-pressure zone.
- The joined air upsurges along with the convective cell.
- It reaches the top of the troposphere up to an altitude of 14 km.
- It further moves toward the poles. This causes accumulation of air at about 30° North and South.
- Another reason for sinking is the cooling of air when it reaches 30 degrees North and South latitudes.
- Downward near the land surface, the air flows towards the equator as the easterlies.
- The easterlies from either side of the equator converge in the Inter-Tropical Convergence Zone (ITCZ).
- Such circulations from the surface up and vice-versa are called cells.
- This type of a cell in the tropics is called Hadley Cell.
- In the mid-latitudes, the circulation is that of dipping cold air that comes from the poles and the mounting warm air that blows from the subtropical high.
- At the surface, these winds are called westerlies and the cell is known as the Ferrel cell.
- At polar latitudes, the cold dense air subsides near the poles and blows towards middle latitudes as the polar easterlies. This cell is called the polar cell.
These Ferrel cells, Hadley Cell, and polar cell set the configuration for the general circulation of the atmosphere.

**General Atmospheric Circulation and its Effects on Oceans**

- The general circulation of the atmosphere also influences the oceans.
- Warming and cooling of the Pacific Ocean is most significant in terms of general atmospheric circulation.
- The warm water of the central Pacific Ocean gradually drifts towards the South American coast and substitutes the cool Peruvian current.
- Such presence of warm water off the coast of Peru is known as the El Nino.
- The El Nino is associated with the pressure variations in Australia and Central Pacific.
- This variation in pressure condition over the Pacific is known as the southern oscillation.
- The combined phenomenon of El Nino and southern oscillation is known as ENSO.