Cabin Pressure and Bleed Air

Why in news?

Recently, a Jet Airways had to turn back shortly after takeoff due to an error in maintaining the cabin air pressure beyond 10,000 ft.

What happened?

- The Jet Airways flight had to be turned back as several passengers suffered nasal and ear bleeding issues.
- It was allegedly due to the failure of the cock-pit crew to maintain cabin pressure.
- As the cabin pressure wasn't maintained, oxygen masks were also deployed, creating panic among the passengers.

What is a pressurized cabin?

- In the early days of aviation, aircraft only flew at lower altitudes.
- 307 Stratoliner introduced by Boeing was the first commercial airliner with a pressurised cabin that could fly up to 20,000 ft.
- The specific feature is that it could maintain "cabin altitude" below 10,000 ft even though the aircraft is flying at 20,000 ft.
- It means that conditions in the cabin would match those that would have prevailed if the aircraft had been flying at 10,000 ft.
- These include temperature, humidity, air circulation and cabin pressure.

How the cabin is pressurized?

- Ambient air is introduced into a compressor inside the aircraft's engine, and heated up rapidly to pressurise the cabin.
- This air, set aside for pressurisation and air-conditioning, is called "bleed air".
- The heated air is sent to a cooling unit, and then sent into the cabin.

- Under takeoff procedures, the bleed air is sometimes turned off when the plane is carrying a payload above a limit.
- This ensures that the engine does not leak the air and uses all of it to create enough thrust for a successful takeoff.

- Until then, air-conditioning is maintained by the auxiliary power unit .
- The pilot needs to ensure that after takeoff, bleed is switched on to maintain cabin pressurisation.

Why maintaining cabin pressure is so important?

- Cabin pressurisation is inevitable as our human body cannot endure an environment above certain altitudes.
- The body would start reacting above 10,000 ft.
- Some of the effects are

1. Gases in the middle-ear, sinuses and digestive tracts would start to expand and cause bleeding from the ears and nose.
2. As the altitude rises, temperature and oxygen levels decrease may cause a risk of frostbite, hypothermia.
3. Similarly deficiency of oxygen in the blood may lead to hypoxia.

Source: The Indian Express