SNS COLLEGE OF TECHNOLOGY

An Autonomous Institution
Coimbatore – 35

Accredited by NBA – AICTE and Accredited by NACC – UGC with ‘A++ Grade
Approved by AICTE , New Delhi and Affiliated to Anna University , Chennai.

DEPARTMENT OF AEROSPACE ENGINEERING

19ASO301 BASICS OF AERONAUTICAL ENGINEERING

UNIT 1 –HISTORY OF FLIGHT

Dr. D K Karthik , Professor &Head-CCE/SNSCT

HISTORY OF FLIGHT

- *History of Flights*
- *Ornithopters*
- *Hot Air Balloon*
- *Development of Flight - 18th & 19th century*
- *Development of Flight - 20th century*
- *Summary*

TEXT BOOK

- ***Anderson. J D, "Introduction to Flight", McGraw-Hill, 1995***

- ***Richard S. Shevel, "fundamentals of Flight", Prentice Hall, 2010***

ORNITHOPTER

Purpose of Ornithopter

- Carry cameras and other payloads.
- Save lives by chasing birds away from airport runways.
- Building ornithopter is an excellent hands on experience for students, as well as great enjoyment for hobbyists

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ORNITHOPTER

Other Uses

- Forestry monitoring
- Security reason
- Bird eye view
- Maps
- Location tracing
- As a spy

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ORNITHOPTER

Major Types of Ornithopter

- Free Flight Ornithopters
- Radio Controlled Ornithopters
- Manned Ornithopters

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HOT AIR BALLOON

HOT AIR BALLOON

First manned balloon

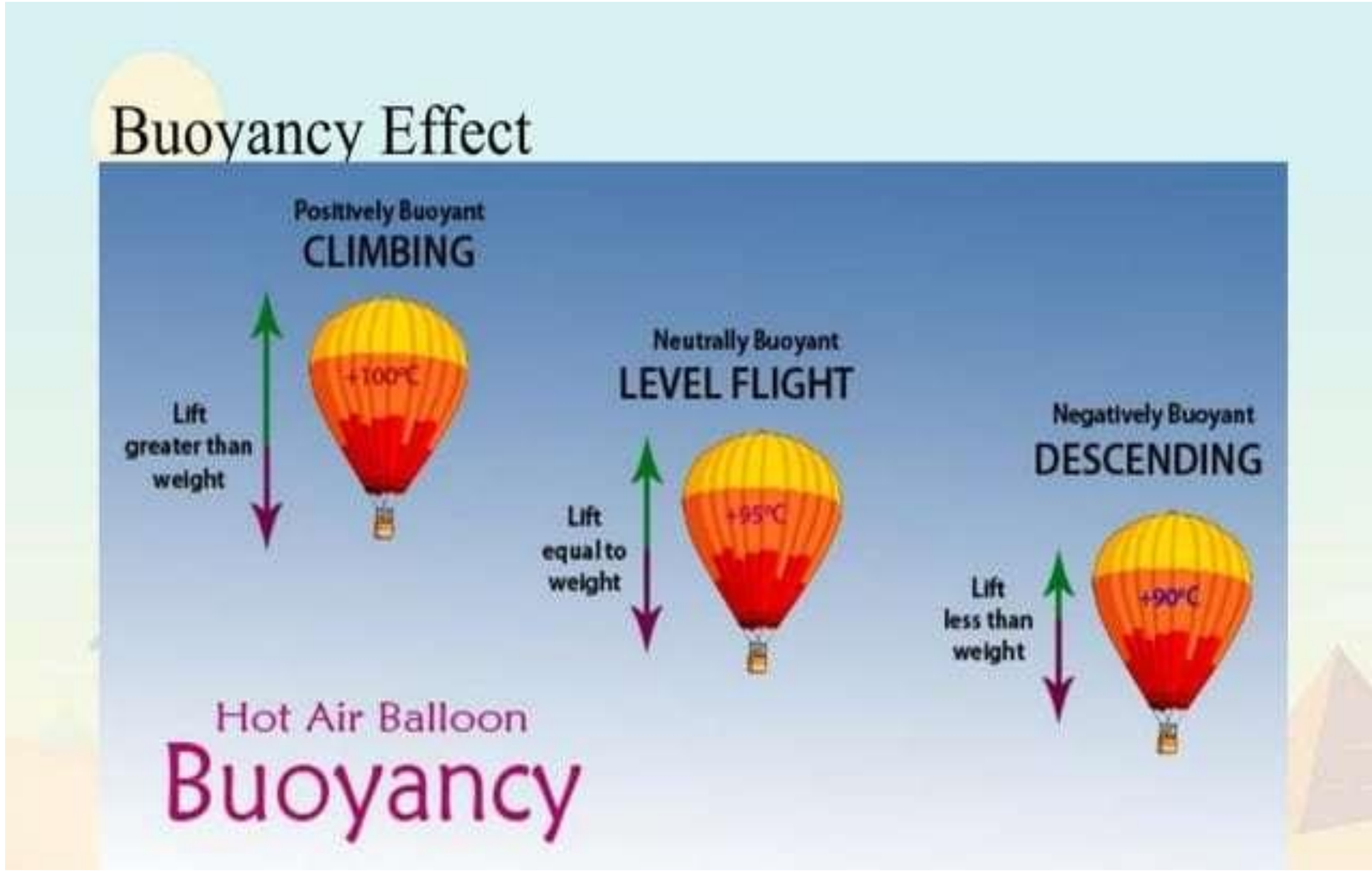
- The first manned balloon was the Montgolfier balloon created by Joseph Michel Montgolfier.
- It's first tethered flight, a flight with people aboard, was on October 15, 1783. It was then used in the French military as an observation post at the Battle of Fleurus (1794).
- Tested with first passengers are a duck, a sheep, and a rooster

HOT AIR BALLOON

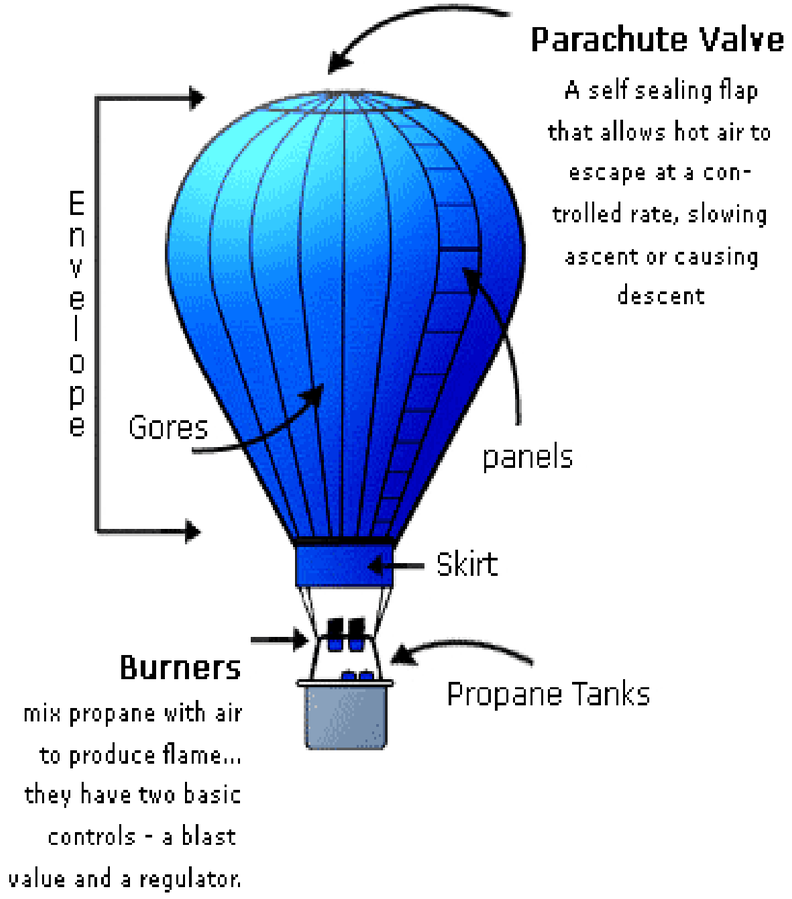
Hot air balloons are based on a very basic scientific principle:

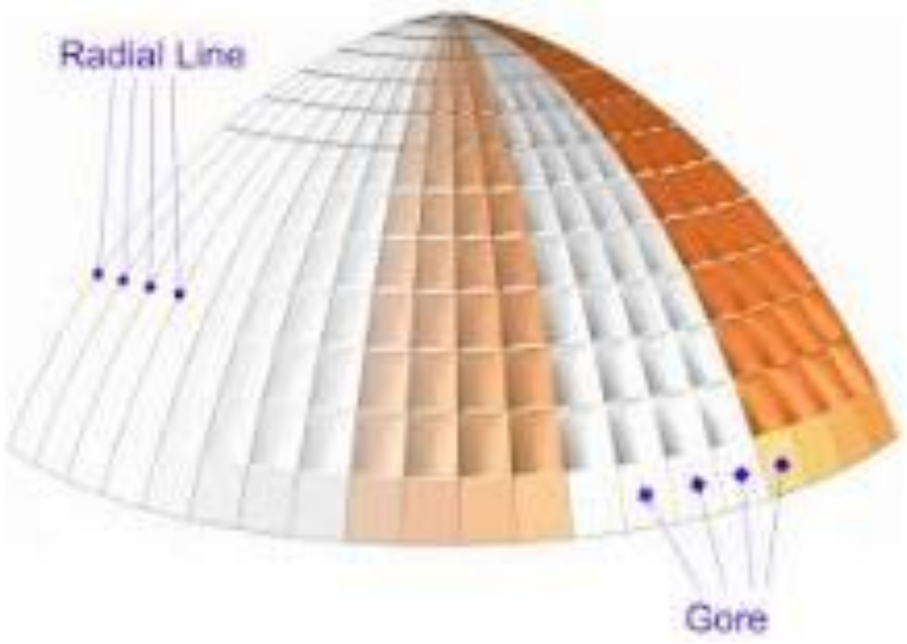
- Warmer air rises in cooler air.
- Hot air is lighter than cool air, because it has less mass per unit of volume.
- A cubic foot of air weighs roughly 28 grams (about an ounce). If you heat that air by 100 degrees F, it weighs about 7 grams less.
- Therefore, each cubic foot of air contained in a hot air balloon can lift about 7 grams. That's not much, and this is why hot air balloons are so huge -- to lift 1,000 pounds, you need about 65,000 cubic feet of hot air.

HOT AIR BALLOON



HOT AIR BALLOON





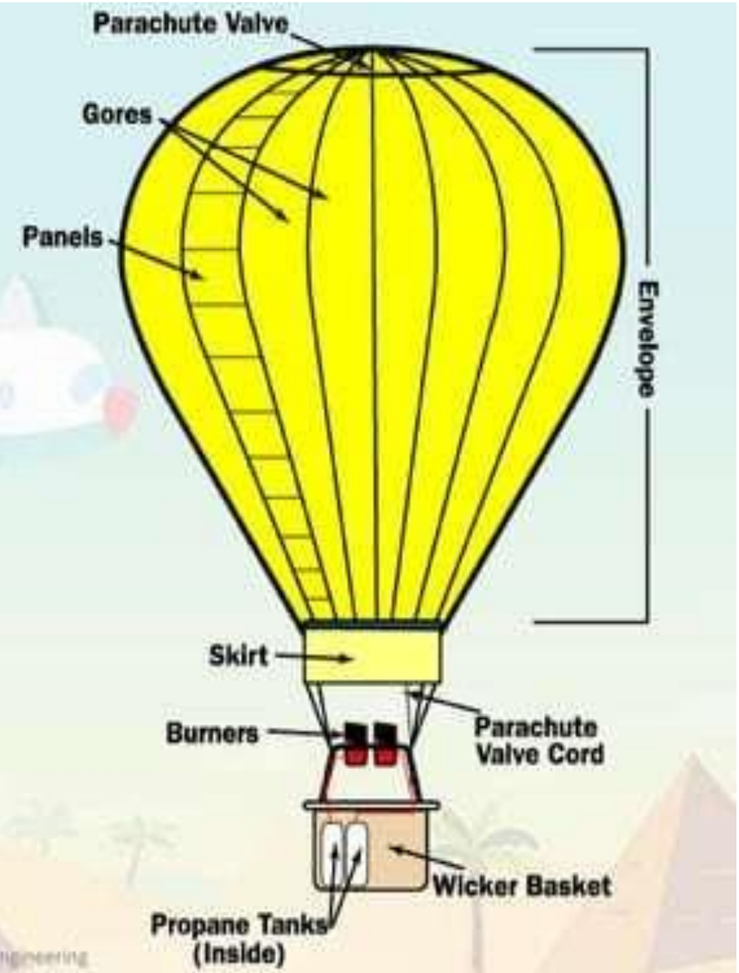
HOT AIR BALLOON

Three essential parts:

- Burner, which heats the air
- The balloon envelope, which holds the air
- The basket, which carries the passengers.

Other Parts of the Hot air balloon

- Coating
- Fuel Tanks
- Parachute Valve
- Instrumentation



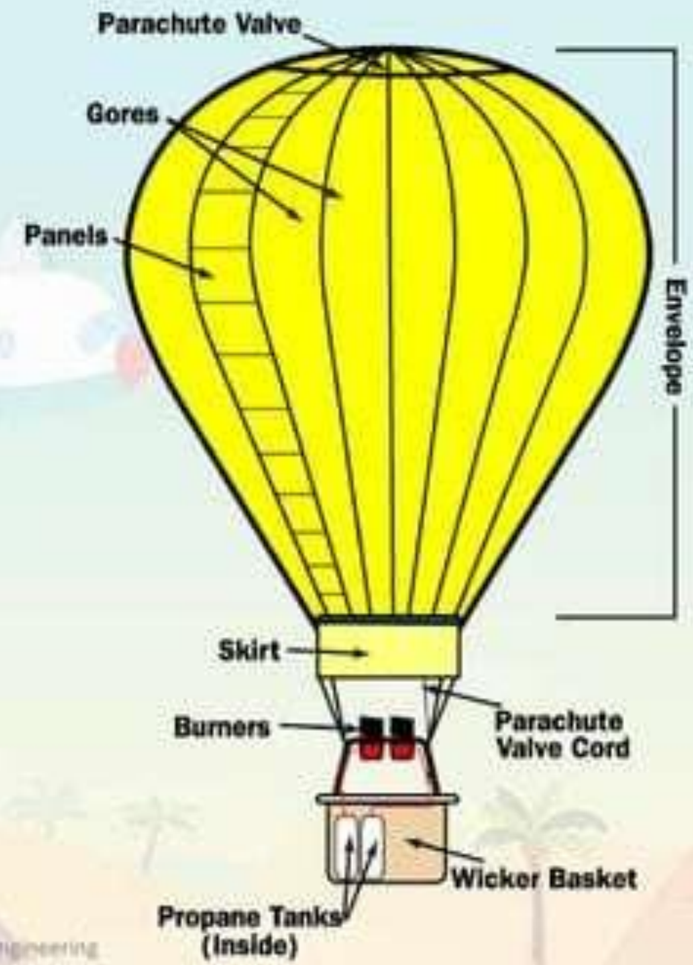
HOT AIR BALLOON

- The heating coil is simply a length of steel tubing arranged in a coil around the burner.
- When the balloonist starts up the burner, the propane flows out in liquid form and is ignited by a pilot light.
- As the flame burns, it heats up the metal in the surrounding tubing. When the tubing becomes hot, it heats the propane flowing through it. This changes the propane from a liquid to a gas, before it is ignited. This gas makes for a more powerful flame and more efficient fuel consumption.

HOT AIR BALLOON

Envelope

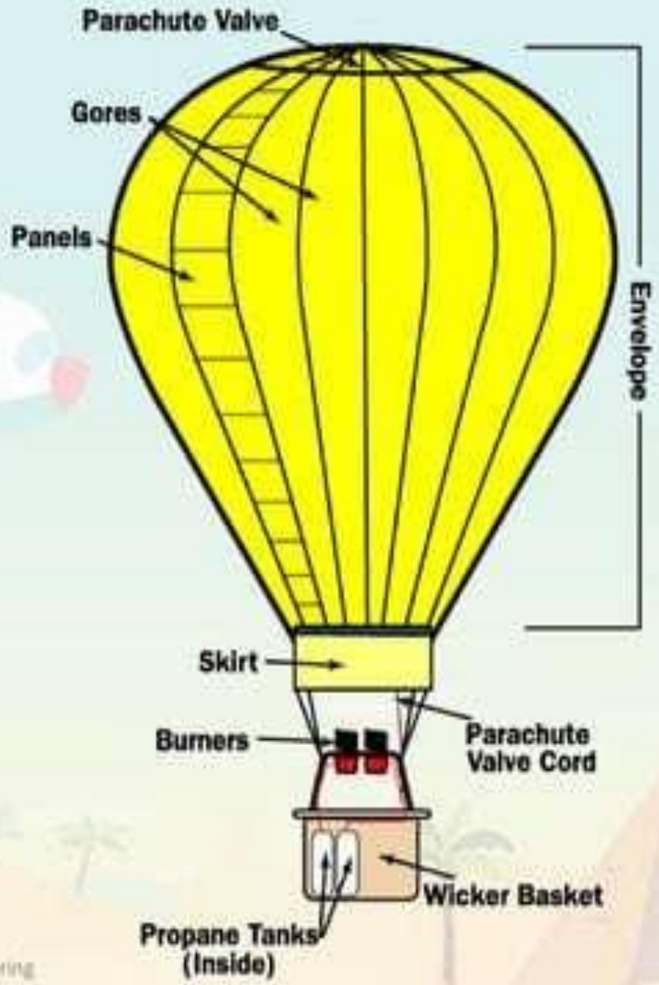
- It is constructed from long nylon gores, reinforced with sewn-in webbing.
- The gores, which extend from the base of the envelope to the crown, are made up of a number of smaller panels.
- Nylon works very well in balloons because it is lightweight,high melting temperature.
- The skirt, the nylon at the base of the envelope, is coated with special fire-resistant material, to keep the flame from igniting the balloon.



HOT AIR BALLOON

Wicker Basket

- Wicker basket for the passenger compartment.
- Wicker works very well because it is sturdy, flexible and relatively lightweight.
- The flexibility helps with balloon landings: In a basket made of more rigid material, passengers would feel the brunt of the impact force. Wicker material flexes a little, absorbing some of the energy.



HOT AIR BALLOON

Piloting a Balloon

- Essentially, these are the only controls -- heat to make the balloon rise and venting to make it sink.
- This raises an interesting question: If pilots can only move hot air balloons up and down, how do they get the balloon from place to place?
- As it turns out, pilots can maneuver horizontally by changing their vertical position, because wind blows in different directions at different altitudes. To move in a particular direction, a pilot ascends and descends to the appropriate level, and rides with the wind. Since wind speed generally increases as you get higher in the atmosphere, pilots can also control horizontal speed by changing altitude.

HOT AIR BALLOON

Launching and Landing

Once the balloon envelope is down on the ground, the crew begins pushing the air out. When the balloon is flattened, the crew packs it into a stuff sack. This whole process is a lot like packing up a giant sleeping bag.