

BASIC ROCKETRY

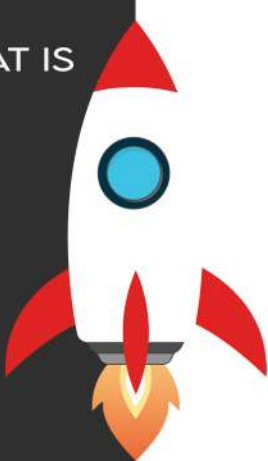
TEAM 10

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WHAT IS ROCKET



A rocket is a vehicle Designed to fly in outer space which get power by continuous combustion of propellants fed into its combustion chamber. It is used to carry humans, satellite and other equipments to space

ROCKET



Rocket is something which is designed to go on outer space or beyond to put man on satellites
Ex-GSLV ,Mk III etc.

Rocket use solid ,as well as liquid engine.

VS

MISSILE

Missile are designed to re-enter our atmosphere to destroy any spot.
Ex- Prithibi, Brahmos etc.

Missile use solid engine



NEWTON'S LAW

1ST LAW

A body will be
in the state
of rest or uniform velocity
until and unless
there is no
force acting on it.

2ND LAW

Rate of change of
momentum is directly
proportional to
applied force.

$$F \propto \frac{p_2 - p_1}{t}$$
$$F \propto \frac{m(v - u)}{t}$$

$$F \propto ma$$

$$F = kma$$

$$k = 1$$

$$F = ma$$

Newton stated 3
important scientific
principle
that governs the
motion of all objects
whether on earth
or space.

3RD LAW

Every reaction has an equal and opposite reaction.

CONSERVATION OF MOMENTUM

Total momentum of any system is conserved, during any process.

Initial momentum=Final momentum
 $m_1v_1=m_2v_2$



Conservation of momentum is the main principle behind rocket propulsion.

ROCKET EQUATION

It was given by a Russian school teacher in 1903

$$\Delta V = v_e \ln \left(\frac{M_i}{M_f} \right),$$



PROPELLANT

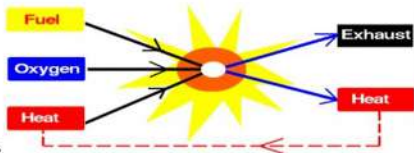
A propellant is a combination of fuel and oxidizer and it is a chemical mixture that is burned to provide propulsion.

Propellant's = Oxidiser + Fuel

Mass fraction = $\frac{\text{Mass of Propellant's}}{\text{Total Mass}}$

Mass fraction's approx. value is about 0.91 (Ideal value)

COMBUSTION CHAMBER



91%-Propellant's mass
3%-Tanks+Fins+Engine etc. mass
6%-Payload's mass

TYPES OF PROPELLANT'S

SOLID

- Homogenous
- Composite

LIQUID

- Petroleum
- Cryogenic
- Hypergolic

HYBRID

EXAMPLES

- 1)Aluminium Perchlorate- Oxidiser
Aluminium-Fuel
- 2)Zinc-Sulphur
(fuel) (oxidiser)

BLENDER

- PBAN
- HTPB

- 1)Petroleum- RP-1,Kerosene(fuel)
LO₂(oxidiser)
- 2)Cryogenic-LO₂+LH₂

CRITERIA FOR CHOOSING PROPELLANT

1) PROPERTY OF PROPELLANTS

- 1)Density
- 2)Storage Temperature
- 3)Toxicity
- 4)Corrosivity

2)SPECIFIC IMPULSE

- 1)Cryogenic
- 2)Petroleum
- 3)Hypergolic

NOZZLE

- The function of the nozzle is to convert the chemical-thermal energy generated in the combustion chamber into kinetic energy.
- The nozzle converts the slow moving, high pressure, high temperature gas in the combustion chamber into high velocity gas of lower pressure and temperature.
- Nozzles consist of a convergent and divergent section.

NOZZLE TYPES

3 primary groups of nozzle types

1. Cone (conical, linear)
2. Bell (contoured, shaped, classic converging-diverging)
3. Annular (spike, aerospike, plug, expansion, expansion-deflection)



PARACHUTE DEPLOYMENT

The parachute helps slow the spacecraft down during entry, descent, and landing. Whereas deployment means the use of something or someone especially in order to achieve a particular effect.

The parachute of model rocket is deployed in two stages. the first stage launches the rocket upwards. The second stage deploys the parachute through a small explosive charge upwards inside the rocket tube up to nosecone, pushing the parachute out and releasing it.



THANK YOU

ANY QUESTIONS